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For current information, refer to:

- Program search: z.umn.edu/publicprogramsearch
- Course search: z.umn.edu/publiccoursecatalog
- University policies: policy.umn.edu
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<td>Medical Physics Ph.D.</td>
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<td>Microbiology, Immunology, and Cancer Biology M.S.</td>
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<td>Leadership in Health Information Technology for Health Professionals Postbaccalaureate Certificate</td>
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<td>Pediatric Nurse Practitioner - Primary Care Postgraduate Certificate</td>
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<td>Advanced Management Training for Clinician Leaders Postbaccalaureate Certificate</td>
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<td>Aging Studies Postbaccalaureate Certificate</td>
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<td>American Indian Public Health and Wellness Postbaccalaureate Certificate</td>
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<td>Public Health Food Protection Postbaccalaureate Certificate</td>
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<td>Program</td>
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Twin Cities Campus
Ecology, Evolution and Behavior M.S.
Ecology, Evolution & Behavior
College of Biological Sciences

Contact Information:
Email: eebgrad@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/eeb/graduate/about-program

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Courses in inorganic chemistry, organic chemistry, biochemistry, general physics, one year of college calculus, animal biology, genetics, physiology, and plant biology are strongly recommended and provide an important background to pursue graduate work in EEB. Proficiency in a foreign language is not required but is strongly recommended for students who expect to pursue field work in a country where English is not the native language. Deficiencies must be made up early in the graduate program.

Special Application Requirements:
Students are admitted only in fall semester, and only with an acceptance by a faculty adviser and a master's project identified. Deadline for application is December 1. Refer to the EEB website for more details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MS is offered under both Plan A (with thesis) and Plan B (without thesis). Plan A requires 20 course credits in the major and 10 thesis credits. Plan B requires 30 course credits and a research paper. Students pursuing the joint JD/MS degree have the exception that some Law courses can be "cross counted" for credit. Degree programs are planned by the student and an advisory committee of three faculty members to meet the student's interests and needs.

EEB Foundations course (8 credits)
All students are expected to complete EEB 8201-8202 their first year. The goal of this course is to provide students in their first year with foundation of knowledge in ecology, evolution, and behavior.
EEB 8201 - Graduate Foundations in Ecology, Evolution and Behavior Semester 1 (4.0 cr)
EEB 8202 - Graduate Foundations in Ecology, Evolution and Behavior - Semester 2 (4.0 cr)

Electives/Supporting Courses (12-22 credits)
Plan A students select a minimum of 12 coursework credits and Plan B students select a minimum of 22 elective credits, in consultation with the advisor. Electives may include courses in statistics or history of science if additional background is needed.
EEB 4129 - Mammalogy (4.0 cr)
EEB 4134 - Introduction to Ornithology (4.0 cr)
EEB 4329 - Primate Ecology and Social Behavior (3.0 cr)
EEB 4839 - Field Studies in Mammalogy (4.0 cr)
EEB 4844 - Field Ornithology (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
EEB 5068 - Plant Physiological Ecology (3.0 cr)
EEB 5371 - Principles of Systematics (3.0 cr)
EEB 5407 - Ecology (3.0 cr)
EEB 5409 - Evolution (3.0 cr)
EEB 5534 - Biodiversity Sci: The origins, maintenance, consequences, detection and assessment of biodiversity [ENV] (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
EEB 5609 - Ecosystem Ecology (3.0 cr)
EEB 5611 - Biogeochemical Processes (3.0 cr)
EEB 8100 - EEB Department Seminar (1.0 cr)
EEB 8150 - EEB Lab Tours (1.0 cr)
EEB 8151 - EEB Lab Tours (1.0 cr)
EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
EEB 8301 - Prelim Proposal Writing Seminar (1.0 cr)
EEB 8302 - EEB Written Prelim Workshop (1.0 cr)
EEB 8360 - Behavioral Biology Seminar (1.0 cr)
EEB 8500 - NSF GRF Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
EEB 8601 - Introduction to Stream Restoration (3.0 cr)
EEB 8602 - Stream Restoration Practice (2.0 cr)
EEB 8641 - Spatial Ecology (3.0 cr)
EEB 8980 - Seminar on Current Topics (1.0 - 3.0 cr)
EEB 8990 - Graduate Seminar (1.0 - 3.0 cr)
EEB 8991 - Independent Study: Ecology, Evolution, and Behavior (1.0 - 10.0 cr)
EEB 8994 - Directed Research (1.0 - 5.0 cr)

Courses Outside of EEB
Students may select graduate-level courses outside of EEB in consultation with their advisor.
AGRO 5121 - Applied Experimental Design (4.0 cr)
BIOL 5272 - Applied Biostatistics (4.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
HSCI 5242 - Navigating a Darwinian World (3.0 cr)
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
HSCI 5401 - Ethics in Science and Technology (3.0 cr)
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PHIL 5602 - Scientific Representation and Explanation (3.0 cr)
PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Ethics Requirement
A four-session ethics seminar offered during the Friday Noon Seminar series. Required areas of ethics include: Academic and Research Community; Authorship; Peer Review and Research Conduct.

Plan A

Plan A Thesis
Take exactly 10 credit(s) from the following:
• EEB 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Joint- or Dual-degree Coursework: JD/MS-Ecology, Evolution, and Behavior Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Ecology, Evolution and Behavior Minor
Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
140 Gortner Laboratory, 1479 Gortner Ave, St. Paul, MN 55108 (612-624-6770, fax: 612-624-6777)
Email: eebgrad@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/eeb/graduate/about-program

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in Ecology, Evolution, and Behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Master's Course List
Take 6 or more credit(s) from the following:
- EEB 5xxx
- EEB 8xxx

Doctoral
Doctoral Course List
Take 12 or more credit(s) from the following:
- EEB 5xxx
- EEB 8xxx
Twin Cities Campus
Ecology, Evolution and Behavior Ph.D.
Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Ecology, Evolution, and Behavior Graduate Program, 140 Gortner Laboratory, 1479 Gortner Avenue, St. Paul, MN 55108 (612-624-6770, fax: 612-624-6777)
Email: eebgrad@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/eeb/graduate/about-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Courses in inorganic chemistry, organic chemistry, biochemistry, general physics, one year of college calculus, animal biology, genetics, physiology, and plant biology are strongly recommended and provide an important background to pursue graduate work in EEB. Proficiency in a foreign language is not required but is strongly recommended for students who expect to pursue field work in a country where English is not the native language. Deficiencies must be made up early in the graduate program.

Special Application Requirements:
Students are admitted only in fall semester. Deadline for application is December 1. Refer to the EEB website for more details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Significant field or laboratory experience, proficiency in using computers in research, and competence in advanced statistics are required. Students are expected to gain some appreciation of history or philosophy of science and are required to teach a minimum of two semesters at 50 percent time. Completion of training in ethics via a seminar series is required. Course plans are discussed and agreed upon by the student and an advisory committee of four to five faculty members.

Required EEB Coursework (12 credits)
Take the following courses:

- EEB 8150 - EEB Lab Tours (1.0 cr)
- EEB 8151 - EEB Lab Tours (1.0 cr)
- EEB 8201 - Graduate Foundations in Ecology, Evolution and Behavior Semester 1 (4.0 cr)
- EEB 8202 - Graduate Foundations in Ecology, Evolution and Behavior - Semester 2 (4.0 cr)
- EEB 8301 - Prelim Proposal Writing Seminar (1.0 cr)
- EEB 8302 - EEB Written Prelim Workshop (1.0 cr)

Elective Coursework (12 credits)
Select at least 12 elective credits, in consultation with the advisor. Electives may include courses in statistics or history of science if additional background is needed.

- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- EEB 4329 - Primate Ecology and Social Behavior (3.0 cr)
- EEB 4839 - Field Studies in Mammalogy (4.0 cr)
- EEB 4844 - Field Ornithology (3.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5068 - Plant Physiological Ecology (3.0 cr)
- EEB 5371 - Principles of Systematics (3.0 cr)
- EEB 5407 - Ecology (3.0 cr)
- EEB 5409 - Evolution (3.0 cr)
- EEB 5534 - Biodiversity Sci: The origins, maintenance, consequences, detection and assessment of biodiversity [ENV] (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 5611 - Biogeochemical Processes (3.0 cr)
- EEB 8100 - EEB Department Seminar (1.0 cr)
- EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
- EEB 8360 - Behavioral Biology Seminar (1.0 cr)
- EEB 8500 - NSF GRF Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- EEB 8641 - Spatial Ecology (3.0 cr)
- EEB 8980 - Seminar on Current Topics (1.0 - 3.0 cr)
- EEB 8990 - Graduate Seminar (1.0 - 3.0 cr)
- EEB 8991 - Independent Study: Ecology, Evolution, and Behavior (1.0 - 10.0 cr)
- EEB 8994 - Directed Research (1.0 - 5.0 cr)

Courses outside of EEB
Courses from the following, or other coursework selected in consultation with the advisor, may be used to fulfill the 24-credit minimum requirement.

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)

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Information current as of November 07, 2022
HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
HSCI 5242 - Navigating a Darwinian World (3.0 cr)
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
HSCI 5401 - Ethics in Science and Technology (3.0 cr)
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PHIL 5602 - Scientific Representation and Explanation (3.0 cr)
PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Ethics requirement
A four-session ethics seminar offered during the Friday Noon Seminar series. Required areas of ethics include: Academic and Research Community; Authorship; Peer Review and Research Conduct.

Quantitative Methods requirement
Competence in advanced statistics is required. Competence may be demonstrated by completing EEB 5042, EEB 5371, STAT 5101, STAT 5201, STAT 5302, STAT 5303, or STAT 5601. Alternatively students may satisfy this requirement through alternative coursework, previous coursework, independent study, or extra-curricular activities as approved by the director of graduate studies.

History or Philosophy of Science requirement
Students are expected to gain some appreciation of history or philosophy of science. Students may satisfy this requirement by completing HSCI 5211, HSCI 5242, HSCI 5244, HSCI 5401, HSCI 8112, HSCI 8920, PHIL 5602 or PHIL 8620. Alternatively, students may satisfy this requirement through alternative coursework, previous coursework, independent study, or extra-curricular activities as approved by the director of graduate studies.

Teaching requirement
Students are required to teach a minimum of two semesters at 50 percent time. Graduate teaching assistant appointments are sufficient to satisfy this requirement. Other teaching experiences may be approved by the director of graduate studies.

Thesis Credits
Take 24 doctoral thesis credits.
EEB 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework: JD/PhD-Ecology, Evolution, and Behavior Student may take a total of 12 credits in common among the academic programs.
**Twin Cities Campus**

**Microbial Engineering M.S.**

*BioTechnology Institute*

**College of Biological Sciences**

Link to a list of faculty for this program.

**Contact Information:**
M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, Saint Paul, MN 55108 (612-624-6774; fax 612-625-5780)

Email: mice@umn.edu

Website: [http://www.bti.umn.edu/MicE](http://www.bti.umn.edu/MicE)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Microbial engineering allows students to pursue an interdisciplinary program that combines microbiology, biochemistry, molecular biology, bioinformatics, chemical engineering, and related sciences. Students perform brief rotations in faculty laboratories to choose an independent project, and tailor their coursework to support and complement their research. Projects can span modern basic microbiology, applied industrial engineering, as well as include computer science and informatics disciplines. After graduation, many students choose to continue on to a PhD program in a related discipline or work directly in biotechnology research and development. Supporting courses are chosen from fields including biochemistry, microbiology, food science, genetics and cell biology, and computer science. The program is coordinated by the BioTechnology Institute (BTI) and involves faculty from 10 departments and 5 institutes of the University.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Science or Engineering Discipline

N/A

Other requirements to be completed before admission:

Typically, applicants with a bachelor's degree in biological sciences, biochemistry, chemistry, or chemical engineering or related engineering disciplines apply. Recommended academic preparation includes one year each of calculus, organic chemistry, physics, microbiology, and a background in a field such as basic chemical engineering, biology, physical chemistry, or genetics. Background deficiencies can be made up during the first year of graduate work. Most students enter the program with a GPA of 3.00 or higher.

**Special Application Requirements:**

Three letters of recommendation, the TOEFL score for international applicants, transcripts, Curriculum Vitae, and an autobiographical statement including occupational goals must be submitted to the director of graduate studies. Applications are accepted for fall semester only. To receive full consideration for financial aid, students must apply for fall semester admission by January 14.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

MicE Requirements

All students are required to sign up for the following courses:

- MicE 5355 (1 Credit during winter break with special registration) and MicE 8990 (1 Credit per semester) Attendance is MANDATORY for two semesters. Two credits are needed for graduation.
- MICE 5355 - Advanced Fermentation and Biocatalysis Laboratory (1.0 cr)
- MICE 8990 - Biotechnology Seminar (1.0 - 3.0 cr)

Computer Proficiency Requirement

Students are required to show evidence of competence in using computers and a practical working knowledge of at least one computer language such as Pascal, Fortran, python, scripting, or statistical packages appropriate to their area of interest. Experience and competence may be obtained by passing a semester of basic computer use and programming courses, or submitting evidence that Equivalent courses of study have been completed elsewhere. (One course upper level required.)

BIOL 5272 - Applied Biostatistics (4.0 cr)

or

CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)

Plan Options

Plan A

Take at least 14 additional course credits, in consultation with the advisor, and 10 thesis credits (MICE 8777).

Thesis Credits

Take at least 10 master's thesis credits.

MICE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

RELATED ELECTIVES

A maximum of 9 credits of 4000-level coursework is allowed. Additional courses can be used with the approval of the director of graduate studies.

Take 14 or more credit(s) from the following:

- BBE 4713 - Biological Process Engineering (3.0 cr)
- BBE 5713 - Biological Process Engineering (3.0 cr)
- BIOC 4125 - Laboratory in Molecular Biology and Biotechnology (3.0 cr)
- BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
- BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
- BIOC 4521 - Introduction to Physical Biochemistry (3.0 cr)
- BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5xxx
- BIOC 8084 - Research and Literature Reports (1.0 cr)
- BIOL 4003 - Genetics (3.0 cr)
- BIOL 4004 - Cell Biology (3.0 cr)
- CHEN 5751 - Biochemical Engineering (3.0 cr)
- CHEN 5xxx
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
- CHEN 8xxx
- FSCN 4121 - Food Microbiology (3.0 cr)
- FSCN 4122 - Food Fermentations and Biotechnology (2.0 cr)
- FSCN 4332 - Food Processing Operations (3.0 cr)
- GCD 5036 - Molecular Cell Biology (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
• GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
• MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
• MICB 4131 - Immunology (3.0 cr)
• MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
• MICB 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)
• MICB 4215 - Advanced Laboratory: Microbial Physiology and Diversity (3.0 cr)
• MICB 4235 - Advanced Laboratory: Virology, Immunology, and Microbial Genetics (3.0 cr)
• MICE 5035 - Personal Microbiome Analysis (3.0 cr)
• MICE 5xx
• MICE 8920 - Teaching Practicum (1.0 cr)
• MICE 8xx
• PMB 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)

-OR-

Plan B
Take 24 additional credits, in consultation with the advisor.

RELATED ELECTIVES
Take 24 or more credit(s) from the following:
• BBE 4713 - Biological Process Engineering (3.0 cr)
• BBE 5713 - Biological Process Engineering (3.0 cr)
• BIOC 4125 - Laboratory in Molecular Biology and Biotechnology (3.0 cr)
• BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
• BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
• BIOC 4521 - Introduction to Physical Biochemistry (3.0 cr)
• BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
• BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
• BIOC 5xx
• BIOC 8084 - Research and Literature Reports (1.0 cr)
• BIOL 4003 - Genetics (3.0 cr)
• BIOL 4004 - Cell Biology (3.0 cr)
• CHEN 5751 - Biochemical Engineering (3.0 cr)
• CHEN 5xx
• CHEN 8xx
• FSCN 4121 - Food Microbiology (3.0 cr)
• FSCN 4122 - Food Fermentations and Biotechnology (2.0 cr)
• FSCN 4332 - Food Processing Operations (3.0 cr)
• GCD 5036 - Molecular Cell Biology (3.0 cr)
• GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
• GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
• MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
• MICB 4131 - Immunology (3.0 cr)
• MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
• MICB 4215 - Advanced Laboratory: Microbial Physiology and Diversity (3.0 cr)
• MICB 4235 - Advanced Laboratory: Virology, Immunology, and Microbial Genetics (3.0 cr)
• MICE 5xx
• MICE 8xx
• BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
• CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
• MICE 5035 - Personal Microbiome Analysis (3.0 cr)
• MICE 8920 - Teaching Practicum (1.0 cr)
• PMB 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
Twin Cities Campus

Plant and Microbial Biology M.S.

Plant and Microbial Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant and Microbial Biology Graduate Program, 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-625-4222)
Email: pmb@umn.edu
Website: https://cbs.umn.edu/academics/departments/pmb/graduate-education

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant and microbial biology encompasses all aspects of plant and microbial life, from molecular biology to genomics to ecosystem science. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students are admitted to the MS program only under special arrangement with a faculty advisor. The deadline to apply is December 1. Refer to the Plant and Microbial Biology website for full details on application requirements and procedures: https://cbs.umn.edu/academics/departments/pmb/graduate-education.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B requires one to three research papers, which may be written in conjunction with graduate courses.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Degree programs are planned by the student and an advisory committee of three faculty members to meet the student’s interests and needs.

**Core Coursework (6 credits)**

Take the following required courses. Take 1 credit of PMB 8900 3 times for a total of 3 credits: section 001 (PMB colloquium), section 002 (Itasca orientation seminar), and section 003 (PMB graduate students seminar).

- **PMB 8081** - Succeeding in Graduate School: Skills, Ethics, and Beyond (3.0 cr)
- **PMB 8900** - Seminar (1.0 cr)

**Electives (14 to 24 credits)**

Plan A students select 14 credits and Plan B students select 24 credits from the following in consultation with the advisor and advisory committee, and with director of graduate studies approval. A maximum of 2 4xxx-level courses is allowed.

Take 14 or more credits from the following:
- AGRO 5xxx
- AGRO 8xxx
- BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
- BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
- BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
- BIOC 4521 - Introduction to Physical Biochemistry (3.0 cr)
- BIOC 5xxx
- BIOL 4003 - Genetics (3.0 cr)
- BIOL 4004 - Cell Biology (3.0 cr)
- BIOL 5xxx
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CSCI 5xxx
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- EEB 5xxx
- EEB 8xxx
- ESCI 8801 - Geomicrobiology (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- FNRM 5xxx
- FNRM 8xxx
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
- GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
- GCD 5xxx
- GCD 8xxx
- GEOG 8260 - Seminar: Physical Geography (2.0 cr)
- GRAD 5xxx
- GRAD 8xxx
- HORT 5xxx
- HORT 8xxx
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
- MICB 4xxx
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- PLPA 5xxx
- PLPA 8xxx
- PMB 4xxx
- PMB 5xxx
- PMB 8xxx
- STAT 5xxx
- STAT 8xxx

**Professional development requirement**

Participate in at least one professional development activity. Options to fulfill this requirement include, but are not limited to: courses (e.g., GRAD 8101 Preparing Future Faculty, BIOL 8100 Improvisation for Scientists), workshops (e.g., career planning, research group
management, teaching skills, leadership development), internships in industry.

Plan A

**Thesis Credits**
Take 10 master's thesis credits.

*CSCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)*
Twin Cities Campus
Plant and Microbial Biology Minor
Plant and Microbial Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant and Microbial Biology Graduate Program, 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-625-4222)
Email: pmb@umn.edu
Website: https://cbs.umn.edu/academics/departments/pmb/graduate-education

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant and microbial biology encompasses all aspects of plant and microbial life, from molecular biology to genomics to ecosystem science. Students study plants from the sub-cellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student’s program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Refer to the Plant and Microbial Biology website for full details on application requirements and procedures: https://cbs.umn.edu/academics/departments/pmb/graduate-education.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters-level Minor
Take at least 6 credits, chosen in consultation with the Plant and Microbial Biology director of graduate studies.

Doctoral-level Minor
Take at least 12 credits, chosen in consultation with the Plant and Microbial Biology director of graduate studies.
**Twin Cities Campus**

**Plant and Microbial Biology Ph.D.**

*Plant and Microbial Biology*

*College of Biological Sciences*

Link to a list of faculty for this program.

**Contact Information:**

Plant and Microbial Biology Graduate Program, 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-625-4222)

Email: pmb@umn.edu

Website: https://cbs.umn.edu/academics/departments/pmb/graduate-education

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant and Microbial Biology encompasses all aspects of plant and microbial life, from molecular biology to genomics to ecosystem science. Students study plants and microbes from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

**Special Application Requirements:**

Students are admitted only in fall semester. The deadline to apply is December 1. Refer to the Plant and Microbial Biology website for full details on application requirements and procedures: https://cbs.umn.edu/academics/departments/pmb/graduate-education.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

30 credits are required in the major.

0 credits are required outside the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Course plans are discussed and agreed upon by the student and an advisory committee of at least four faculty members.

Core Coursework (9 credits)
Complete the following required courses. Take 1 credit of PMB 8900 3 times for a total of 3 credits: section 001 (PMB colloquium), section 002 (Itasca orientation seminar), and section 003 (PMB graduate students seminar). Take 1 credit of PMB 8994 in fall semester of the first year.

- PMB 8081 - Succeeding in Graduate School: Skills, Ethics, and Beyond (3.0 cr)
- PMB 8900 - Seminar (1.0 cr)
- PMB 8901 - Preparation of Research Proposals (2.0 cr)
- PMB 8994 - Research (1.0 - 5.0 cr)

Electives/Supporting Courses (21 credits)
Select at least 21 credits in consultation with the academic advisor and advisory committee, and with director of graduate studies approval, to complete the 30 course credits required. A maximum of 2 4xxx-level courses is allowed.

Take 21 or more credit(s) from the following:
- AGRO 5xxx
- AGRO 8xxx
- BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
- BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
- BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
- BIOC 4521 - Introduction to Physical Biochemistry (3.0 cr)
- BIOC 5xxx
- BIOL 4003 - Genetics (3.0 cr)
- BIOL 4004 - Cell Biology (3.0 cr)
- BIOL 5xxx
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CSCI 5xxx
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- EEB 5xxx
- EEB 8xxx
- ESCI 8801 - Geomicrobiology (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- FNRM 5xxx
- FNRM 8xxx
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
- GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
- GCD 5xxx
- GCD 8xxx
- GEOG 8260 - Seminar: Physical Geography (2.0 cr)
- GRAD 5xxx
- GRAD 8xxx
- HORT 5xxx
- HORT 8xxx
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
- MICB 4xxx
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- PLPA 5xxx
- PLPA 8xxx
- PMB 4xxx
- PMB 5xxx
- PMB 8xxx
- STAT 5xxx
- STAT 8xxx

Professional development requirement
Participate in at least one professional development activity. Options to fulfill this requirement include, but are not limited to: courses (e.g., GRAD 8101 Preparing Future Faculty, BIOL 8100 Improvisation for Scientists), workshops (e.g., career planning, research group management, teaching skills, writing skills, leadership development), internships in industry.
**Thesis Credits**
Take at least 24 doctoral thesis credits.

**PMB 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Addictions Counseling M.P.S.
CCAPS Addiction Studies
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies Information Center, 20 Ruttan Hall, 1994 Buford Ave, St Paul, MN 55108, (612-624-4000)
Email: ccapsinfo@umn.edu
Website: https://ccaps.umn.edu/addictions-counseling-masters-degree

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Addictions Counseling MPS offers rigorous, evidence-informed, applied clinical preparation for individuals new to the helping profession, as well as those with allied licenses (MSW, LP, LPC, LMFT) seeking an additional credential. The curriculum reflects specific licensure preparation content for the State of Minnesotas Licensed Alcohol and Drug Counselor (MNLADC) license, and includes evidence-based practices and evaluation; individual and group counseling skills; professional ethics; diversity and cultural sensitivity training; co-occurring assessment and treatment interventions; and an applied field placement experience. For additional information regarding MNLADC requirements, please refer to the State of Minnesotas LADC website.

Students can choose to complete the MPS on a full- or part-time basis. Full-time students can complete the degree in five semesters (two academic years and one summer session). Part-time students have up to five years to complete the degree.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Bachelor's degree from an accredited institution - Transcripts - Personal statement - Two letters of reference - Updated resume or CV

Special Application Requirements:
International applicants should contact the Universitys International Student and Scholar Service Office (www.isss.umn.edu) for information on visa status and academic requirements.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Plan C: Plan C requires 30 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The ADDS 5996 Internship Seminar serves as a capstone experience where students apply the knowledge and skills learned in their previous courses in a real world clinical setting. The 880-hour internship seminar includes close clinical supervision from both a site and faculty supervisors, participation in formal on-campus clinical supervision meetings, and active engagement in weekly required postings and practice assignments. The capstone experience concludes with an extensive formal written and oral evaluation process to ensure ethical and competent clinical practice.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Application of coursework from other institutions is allowed on an exception basis. Refer to the Addictions Counseling MPS website at https://ccaps.umn.edu/addictions-counseling-masters-degree for additional information and assistance.

Courses applied to the MPS degree must be graded B- or higher. All courses offered A/F or S/N must be taken A/F.

Full-time students complete coursework requirements on a specified schedule to support degree completion in five semesters. Refer to the Addictions Counseling MPS website and confer with the advisor for more information.

Foundation Courses (9 credits)
Take the following courses, in consultation with the advisor, the first year of study:

- ADDS 5011 - Foundations in Addiction Studies (2.0 cr)
- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- ADDS 5031 - Applied Psychopharmacology (2.0 cr)
- ADDS 5071 - Foundations of Co-occurring Disorders (2.0 cr)

Required Courses (14 credits)
Take the following courses in consultation with the advisor. ADDS 5041, 5061, 5091, and 5121 must be taken prior to the internship (ADDS 5996). ADDS 5081 may be taken concurrently with the internship.

- ADDS 5041 - Methods and Models I: Motivational Counseling (2.0 cr)
- ADDS 5051 - Methods and Models II: Cognitive Behavioral Therapy (2.0 cr)
- ADDS 5061 - Foundations of Group Work (3.0 cr)
- ADDS 5081 - Multicultural Foundations of Behavioral Health (3.0 cr)
- ADDS 5091 - Assessment and Treatment Planning I (3.0 cr)
- ADDS 5121 - Professional Seminar 1: Internship Prep (1.0 cr)

Elective Courses (3 credits)
Select 3 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor approval.

- HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
- HSEX 6211 - Dimensions of Sexual Functioning (3.0 cr)
- HSEX 6013 - Perspectives and Practices in Sexual Health Education (3.0 cr)
- IBH 6021 - Methods and Models III: Synthesis Seminar in Client Centered Care (2.0 cr)
- IBH 6071 - Advanced Professional Issues: Ethics (3.0 cr)
- IBH 6081 - Human Lifespan Development and Behavioral Health (3.0 cr)
- IBH 6091 - Intersection of Career and Mental Health (3.0 cr)
- IBH 6101 - Family Dynamics and Therapy (3.0 cr)
- IBH 6111 - Research and Evaluation Methods (3.0 cr)
- IBH 6221 - Applications of Counseling Theories (3.0 cr)
- IBH 6222 - Adolescents and Co-occurring Substance Use and Mental Health Disorders (3.0 cr)
- IBH 6233 - DBT Skills Training: Group Practices and Treatment Modalities (2.0 cr)
- IBH 6234 - Counseling Grief and Loss (2.0 cr)

Internship (4 credits)
Take the following internship. The internship includes 880 hours of field experience.

- ADDS 5996 - Internship in Behavioral Health (1.0 cr)
Twin Cities Campus
Addictions Minor
CCAPS Addiction Studies
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies
20 Ruttan Hall
19994 Buford Ave
St Paul, MN 55108

612-624-4000
Email: ccapsibh@umn.edu
Website: https://ccaps.umn.edu/degrees-and-minors

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The addictions minor expands access to courses in the MPS in Addictions Counseling and MPS in Integrated Behavioral Health programs courses to the wider graduate student population, meeting a need for addictions-related coursework for students in related graduate and professional programs. Students in other disciplines may also find value in expanding their foundational knowledge of addictions for their own research and post-graduation career development. Finally, students in allied professional programs wishing to seek licensure can take this ADDS coursework in addition to specific host program coursework and internship requirements toward the Minnesota Licensed Alcohol and Drug Counselor (MNLADC) credential.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students must be admitted to a graduate degree program at the University of Minnesota and be in good standing.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students working toward allied licensure in counseling/therapy are required to meet specific internship requirements in addition to this coursework. Students interested in the LADC will need to work with their home program advisors to ensure they meet licensing-specific internship requirements.

All courses must be completed with a minimum grade of B-.

Required Courses - 12 credits
Students admitted to a graduate program at the university must take the following courses to earn the 12 credit Minor. ADDS 5091 is the only course with a prerequisite: ADDS 5021. Students in the Minor will be permitted to waive this prerequisite.

ADDS 5011 - Foundations in Addiction Studies (2.0 cr)
ADDS 5031 - Applied Psychopharmacology (2.0 cr)
ADDS 5071 - Foundations of Co-occurring Disorders (2.0 cr)
ADDS 5081 - Multicultural Foundations of Behavioral Health (3.0 cr)
ADDS 5091 - Assessment and Treatment Planning I (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus

Applied Sciences Leadership M.P.S.
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
CCAPS - Degree and Credit Programs Room 20 RuttanH 6045B 1994 Buford Ave St. Paul, MN 55108
Email: ccapsinfo@umn.edu
Website: https://ccaps.umn.edu/master-professional-studies-applied-sciences-leadership

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Applied Sciences Leadership MPS is a fully online degree that provides working, non-traditional students the opportunity to enhance the qualitative human-centered and quantitative data-focused professional skills integral to workplace success and advancement. Through coursework and a capstone project, graduates will gain the crucial broad, cross-competency leadership skills and deep knowledge of their selected scientific focus that emphasized by employers.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelors degree in a related sciences field from an accredited post-secondary US institution is required

Other requirements to be completed before admission:
- A minimum 3.0 GPA is preferred.
- Online University application
- Online application fee
- Resume or CV
- Professional Statement (1-2 pages)
- Two letters of recommendation from academic or professional referees

Special Application Requirements:
International applicants are strongly encouraged to contact the Universitys International Student and Scholar Services office (www.isss.umn.edu) for visa requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 84
- MN Batt
Key to test abbreviations (TOEFL, IELTS, MELAB, MN Batt).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: ASCL 6002, completed in consultation with the advisor, comprises the application of knowledge gained through program coursework to the investigation of a scientific question in the students selected focus area.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must earn a minimum grade of B- for courses taken on the A-F grading basis.

Bookend Courses (6 credits)
Take the following courses:
- ASCL 6001 - Perspectives in Integrated Applied Sciences (3.0 cr)
- ASCL 6002 - Applied Sciences Leadership Capstone (3.0 cr)

Core Courses (12 credits)
Take the following courses:
- ASCL 6312 - Finance for Non-financial Managers (3.0 cr)
- ASCL 6313 - Data for Decision Making (3.0 cr)
- ASCL 6315 - Legal and Ethical Business Issues for Science Professionals (3.0 cr)

Option
Take either ASCL 6314 OR ASCL 6316
- ASCL 6314 - Leading Projects and Teams (3.0 cr)
- or ASCL 6316 - Transformational Leadership in an Intercultural World (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Integrated Food Systems Leadership
Students pursuing the University's Integrated Food Systems Leadership (IFSL) graduate certificate may apply the following courses to certificate credit requirements. Refer to the Integrated Food Systems Leadership certificate website for more information.

Integrated Food Systems Leadership Track (12 credits)
Take the following courses.
- IFSL 7001 - Keys to Authentic and Effective Leadership (2.0 cr)
- IFSL 7011 - Food Production Farm to Fork (2.0 cr)
- IFSL 7021 - Food Governance, Policy, and Regulation (2.0 cr)
- IFSL 7031 - Food Security, Safety, and Defense (2.0 cr)
- IFSL 7041 - Food Business, Marketing, and Product Development (2.0 cr)
- IFSL 7051 - Leading Across Integrated Food Systems (2.0 cr)

Poultry Health
Students pursuing the University's Poultry Health graduate certificate may apply the following courses to certificate credit requirements. Refer to the Poultry Health certificate website for more information.

Required Courses (9 credits)
Take the following courses.
- POUL 5101 - Living in a microbial world and raising animals: the poultry perspective (3.0 cr)
- POUL 5102 - How safe is your chicken? Food safety from a poultry perspective (3.0 cr)
POUL 5103 - Poultry biosecurity: framework for healthy production (3.0 cr)

Electives (3 credits)
Select 3 credits from the following, in consultation with the advisor.
Note: Elective POUL 5016 includes a required one week in-person component.
Take 3 or more credit(s) from the following:
- POUL 5001 - Avian Anatomy and Physiology (1.0 cr)
- POUL 5002 - Poultry Nutrition (1.0 cr)
- POUL 5003 - Poultry Diseases (1.0 cr)
- POUL 5013 - Animal Welfare (1.0 cr)
- POUL 5015 - Broiler/Layer/Turkey Rotation (1.0 cr)
- POUL 5016 - Capstone in Molecular Technologies (1.0 cr)

Regulatory Affairs for Food Professionals
Students pursuing the University’s Regulatory Affairs for Food Professionals graduate certificate may apply the following courses to certificate credit requirements. Refer to the Regulatory Affairs for Food Professionals certificate website for more information.

Required Courses (12 credits)
Take the following courses.
- ASCL 6212 - Regulatory Affairs for Food Product Development and Market Entry (3.0 cr)
- ASCL 6213 - Regulatory Affairs for Food Production and Distribution (3.0 cr)
- ASCL 6214 - Regulatory Affairs for Food Claims and Labeling (3.0 cr)
- ASCL 6215 - Landmark Food Cases Shifting Regulatory Policy (3.0 cr)
Twin Cities Campus
Arts and Cultural Leadership M.P.S.
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College Continuing and Professional Studies, M.P.S. in Arts and Cultural Leadership, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000; fax: 612-626-2800)
Email: ccapsinfo@umn.edu
Website: https://ccaps.umn.edu/arts-and-cultural-leadership-masters-degree

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Arts and Cultural Leadership (ACL) program is designed for students who have at least three years of professional, volunteer, and/or advocacy work in the arts and cultural field. Required curriculum, blended with flexible course work, allows students to build a program around their current strengths, experiences, and career direction. Courses in leadership and nonprofit management, along with seminars and directed studies in arts and cultural studies, provide working adults a degree with a clear, career-related focus.

The ACL program is designed to help students:

Gain insight and develop approaches to creating and stewarding the relationships and interdependencies necessary for sustaining a vibrant arts community
Refine strategic planning and communications skills in order to better lead organizations in complex environments
Advocate for the arts and culture sector by promoting better understanding and integrating the economic, political, ethical, technological, and diverse social environments in which it functions
Understand and convey the international context for the arts and the impact of the global economy
Appreciate and nurture the creative process, recognizing how art and the artist function in society

The ACL program uses a foundation of 18 credits (out of 30 that are required for the degree), with latitude built in to pursue elective coursework in support areas such as nonprofit management, leadership, education, public affairs/policy, urban planning, strategic planning, etc. Using an applied learning approach, students receive a high-quality education that draws on the expertise of University faculty and community-based faculty.

By the end of the program, students will be knowledgeable in:

Critical and strategic thinking, and effective communication
The intersection, navigation, and impact of cultural and creative practices within local and global dynamics
Policy formation, implementation, and application relevant to culture, creativity, and the arts
Leadership practices in a variety of contexts
How to implement expertise, improve relationships, and optimize resources

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary US institution or its foreign equivalent.

Other requirements to be completed before admission:
Evidence of experience in/commitment to the arts and cultural field (for example, through professional, volunteer, or advocacy experience or internships).

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Information current as of November 07, 2022
Factors of academic preparation, relevant experience, evidence of readiness and maturity, writing ability, and reasons for seeking the degree will be taken into account as part of the admissions review. GRE scores may be submitted, but are not required.

**Special Application Requirements:**
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, a current resume, two letters of recommendation, a two- to three-page written statement of purpose in which the student elaborates on his or her interest in the program, and an additional writing sample of approximately 10 pages. Application deadlines are in spring for fall semester admission, and fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- **MELAB**
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The final project provides students with an opportunity to focus on the needs of a particular organization or community as they identify and carry out, in consultation with the leadership of that group and their academic advisor(s), a project that meets a need within that group and reflects both the interest of the students and their academic achievement. See the department for more details.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required courses must be taken A-F and earn a B- or better. Elective courses taken A-F must earn a B- or better.

#### Required Courses (15 credits)
Take the following courses:

- **ACL 6001** - A Multiplicity of Ways: Epistemologies In the 21st Century (1.0 cr)
- **ACL 5211** - Trends and Impacts in Arts and Cultural Leadership and Management (3.0 cr)
- **ACL 5221** - Creative Entrepreneurship and Resource Development (3.0 cr)
- **ACL 5231** - Ethical Dilemmas and Legal Issues for Cultural Leaders (3.0 cr)
- **ACL 6201** - Reimagining Cultural Leadership (3.0 cr)
- **ACL 6202** - Service Leadership and Board Practicum (2.0 cr)

#### Electives (12 credits)
Select 12 credits from the following in consultation with the advisor. Other courses, from related academic departments including ACL, MST, OLPD, and PA, can be applied to this requirement with advisor approval. Electives should relate to the professional tasks required of arts and cultural leaders or enhance the student's understanding of the arts within a broader cultural context.

- **ACL 5100** - Topics in Arts and Cultural Leadership (1.0 - 4.0 cr)
- **ACL 5241** - Financial Management for Arts Nonprofits, Community Organizations, and Artists (3.0 cr)
- **ACL 5251** - Courageous Imagination in Action: Art and Culture as Forces and Resources of Change (3.0 cr)
- **ACL 5261** - Culture, Place and Equitable Communities: Ways of Living Together in the 21st Century (3.0 cr)
- **ACL 5950** - Special Topics (1.0 - 4.0 cr)
- **ACL 5993** - Directed Studies (1.0 - 4.0 cr)
- **ASCL 6312** - Finance for Non-financial Managers (3.0 cr)
ASCL 6313 - Data for Decision Making (3.0 cr)
CIVE 6001 - Critical Approaches to Civic Engagement (3.0 cr)
CIVE 6311 - Facilitating Community Driven Leadership (3.0 cr)
DES 5165 - Design and Globalization (3.0 cr)
GCC 5005 - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
GEOG 8106 - Seminar: Social and Cultural Geography (3.0 cr)
JOUR 4263 - Strategic Communication Campaigns (3.0 cr)
JOUR 5251 - Strategic Communication Theory (3.0 cr)
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
MST 5012 - Museum Practices (3.0 cr)
PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5102 [Inactive] (3.0 cr)
PA 5103 - Leadership and Change (1.5 - 3.0 cr)
PA 5104 - Strategic Human Resource Management (3.0 cr)
PA 5190 - Topics in Public and Nonprofit Leadership and Management (1.0 - 3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5251 - Strategic Planning and Management (3.0 cr)
PA 5253 [Inactive] (3.0 cr)
Other electives chosen in consultation with student's adviser.

Final Project (3 credits)
Take the following courses:
ACL 6002 - Capstone: Applied Research Project (1.0 cr)
ACL 6003 - Capstone: Reflections and Presentation (2.0 cr)
Twin Cities Campus

Biological Sciences M.B.S.
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies, Master of Biological Sciences Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000; fax: 612-626-2800)
Email: ccapsmb@s.umn.edu
Website: https://ccaps.umn.edu/biological-sciences-masters-degree

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Biological Sciences

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of biological sciences (MBS) degree is a highly flexible graduate-level program designed to meet the needs of members of the working community who wish to increase their knowledge in areas of modern biology. Students focus their studies in one of three broad areas: molecular biosciences, cellular and organismal biology, or environmental and population biology. Limited elective credits in areas, such as education, business, and public health can be used to support a student's individual career goals and program focus. The degree enables recipients to learn new job skills, change professional emphasis, or provide added value to their present job and may be completed on a part-time basis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary US institution or its foreign equivalent.

Other requirements to be completed before admission:
Evidence of knowledge of current, college-level concepts of basic chemistry, organic chemistry, and some biology coursework is required. Transcripts showing equivalent coursework combined with professional experience will be considered for application toward fulfillment of the prerequisites for admission. Two years of relevant experience in the workforce is preferred for admission.

Special Application Requirements:
A statement of career goals, letters of reference, transcripts for all undergraduate and post-baccalaureate degrees or coursework, and an updated resume must accompany the application. Application deadlines are in the spring for fall semester admission, and in the fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is carried out under the direction of a faculty member. It can be literature-based or lab-based with a testable hypothesis and a final paper of 30-50 pages in length, which is an in-depth examination and analysis of a particular area, problem, technique, etc.

Plan C: Plan C requires 30 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The Plan C requirement is the Capstone course MBS 6003.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The program includes coursework, independent study, and a project for Plan B master's students or capstone course for Plan C master's students. With guidance from program advisors, students complete 30 credits. MBS candidates may transfer up to 10 credits into the program. Foundation credits may be waivered or substituted if the student can show proficiency in the subject area. A bioethics requirement may be met with a credit or non-credit course. Coursework is taken from the regular graduate-level coursework. An overall GPA of 3.00 is required for the degree to be awarded.

Introductory Course (1 credit)

MBS 6001 - Introduction to Research in the Biological Sciences (1.0 cr)

Biochemistry Foundation (3 credits)

BIOC 6021 - Biochemistry (3.0 cr)

Biological Sciences Courses (17 - 23 credits)

Courses in the student's area of concentration within the biological sciences chosen in consultation with student's advisor. One course in at least two of the following areas should be taken: Molecular Biosciences, Cellular and Organismal Biology, Environmental and Population Biology. Up to 6 credits of directed research or directed study courses can be included. Plan C students MUST take at least 1 credit of MBS 6110.

Take 17 - 23 credit(s) from the following:

• Courses in the student's area of concentration within the biological sciences chosen in consultation with student's advisor.

Electives (0 - 6 credits)

Elective courses outside the biological sciences chosen with student's advisor.

Take 0 - 6 credit(s) from the following:

• Elective courses outside the biological sciences chosen with student's advisor.

Final Project or Capstone (3 credits)

Plan B students take MBS 6002 in their final semester.
Plan C students take MBS 6003 in their final semester.
MBS 6002 - Final Project Course for Plan B MBS Students (3.0 cr)
or MBS 6003 - Capstone Course for Plan C MBS Students (3.0 cr)
Twin Cities Campus
Civic Engagement M.P.S.
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies Information Center, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN, 55108 (612-624-4000)
Email: ccapsinfo@umn.edu

• Program Type: Master’s
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Civic Engagement MPS meets the unique needs of working adult students looking to enhance their knowledge and credentials as T-shaped professionals. The T-shaped professional has a combination of broad applied managerial skills complemented by disciplinary knowledge in a focused area. Students in this major will benefit from exposure to the qualitative human-centered and quantitative data-focused applied professional skills that have become integral to workplace success. They will be well-positioned to take on challenges in the ever-changing global workforce. Graduates of this degree program will:
- Analyze and implement applied business practices and graduate level inquiry within interdisciplinary civic engagement frameworks
- Develop managerial and advanced communications skills
- Enhance critical thinking and creative problem-solving skills to develop collaborative solutions for professional goals
- Synthesize and apply the larger ethical framework of the profession to the communities served - Amalgamate their disciplinary expertise with their individual passion for a specific cause within the larger scope of civic engagement

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Bachelor’s degree from an accredited institution - Transcripts - Personal statement - Two letters of recommendation from academic or professional referees - Updated resume or CV

Special Application Requirements:
International students interested in the M.P.S. in Civic Engagement should contact the International Student and Scholar Service (www.isss.umn.edu) for information on visa status and academic requirements.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 84
• MN Batt
Key to test abbreviations (TOEFL, IELTS, MELAB, MN Batt).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. The thesis is the final exam. A capstone project is required.

Capstone Project: The capstone course (APS 6002) synthesizes the completed disciplinary and applied business coursework, and facilitates completion of an individualized, applied project based on the student’s community-engagement career focus. This culminating experience, taken in the final year of the program, provides students with an opportunity to engage in creative problem solving to address pressing real-world needs.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students must earn a grade of B- or better for courses taken on the A-F grade basis.

Required Courses (18 credits)

Take the following courses:

- CIVE 6001 - Critical Approaches to Civic Engagement (3.0 cr)
- CIVE 6311 - Facilitating Community Driven Leadership (3.0 cr)
- ASCL 6312 - Finance for Non-financial Managers (3.0 cr)
- ASCL 6313 - Data for Decision Making (3.0 cr)
- ASCL 6314 - Leading Projects and Teams (3.0 cr)
- CIVE 6002 - Civic Engagement Capstone (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Civic Life and Social Justice

This sub-plan is limited to students completing the program under Plan C.

Students who pursue the Civic Life and Social Justice track have a passion for improving the world around them, serving the community, and enacting social justice. Whether they are activists hoping to bring business or people management skills to their organizations, or they work in nonprofits or non-governmental organizations, this track offers exposure to contemporary civic and social issues.

Civic Life and Social Justice (12 credits)

Take 12 (or more) credits from the following. Other coursework may be applied to the requirement with prior program approval.

- ACL 5211 - Trends and Impacts in Arts and Cultural Leadership and Management (3.0 cr)
- COMM 5231 - Media Outlaws (3.0 cr)
- ENGL 8300 - Seminar in American Minority Literature (3.0 cr)
- HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
- PA 8312 - Analysis of Discrimination (4.0 cr)
- SOC 8551 - Life Course Inequality & Health (3.0 cr)

Perspectives in Global Citizenship

This sub-plan is limited to students completing the program under Plan C.

Students who pursue the Perspectives in Global Citizenship track seek a broad knowledge of what it means to be a global citizen, and the inherent opportunities and tensions that arise from living in a global society. Students may seek jobs in healthcare and health disparity nonprofits, non-governmental organizations focused on climate change, wealth inequalities, maternal and child health, or diversity and equity issues.
**Perspectives in Global Citizenship (12 credits)**

Take 12 (or more) credits from the following. Other courses may be applied to this requirement with prior program approval.

- **BTHX 5710** - Ethical Issues in Global Health (3.0 cr)
- **CSPH 5118** - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
- **ESPM 5241** - Natural Resource and Environmental Policy (3.0 cr)
- **GCC 5005** - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
- **GCC 5007** - Toward Conquest of Disease [ENV] (3.0 cr)
- **GCC 5008** - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
- **GCC 5011** - Pathways to Renewable Energy [TS] (3.0 cr)
- **GCC 5013** - Making Sense of Climate Change: Science, Art, and Agency [CIV] (3.0 cr)
- **GCC 5014** - The Future of Work and Life in the 21st Century [TS] (3.0 cr)
- **GCC 5017** - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
- **GCC 5031** - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
- **HSEX 6011** - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
- **PA 5161** - Redesigning Human Services (3.0 cr)
- **PA 5422** - Diversity and Public Policy (3.0 cr)
- **PA 5601** - Global Survey of Gender and Public Policy (3.0 cr)
- **PA 5724** - Climate Change Policy (3.0 cr)

**Election Administration**

Students who pursue the Election Administration track are involved in election administration at the local, state, or national level. The online curriculum completes the 30-credit minimum for the MPS degree. Students who also choose to pursue and are admitted to the Election Administration post-baccalaureate certificate offered by the Humphrey School of Public Affairs can apply the following courses to that credentials credit requirements.

**Required Courses (7 credits)**

Take the following courses:

- **PA 5971** - Survey of Election Administration (3.0 cr)
- **PA 5972** - Elections and the Law (2.0 cr)
- **PA 5973** - Strategic Management of Election Administration (2.0 cr)

**Electives (5 credits)**

Select at least 5 credits from the following:

- **PA 5975** - Election Design (2.0 cr)
- **PA 5976** - Voter Participation (1.0 cr)
- **PA 5982** - Data Analysis for Election Administration (2.0 cr)
- **PA 5983** - Introduction to Election Security (1.0 cr)
- **PA 5984** - Elections Security: How to Protect America’s Elections (2.0 cr)

**Self Designed Track**

This sub-plan is limited to students completing the program under Plan C.

Students interested in a disciplinary area outside the three defined tracks select 12 credits of electives to complete the MPS 30-credit minimum, in consultation with their advisor, that explores a specific area of interest. Selected coursework must be approved by the director of graduate studies.
Twin Cities Campus
Horticulture M.P.S.
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
Email: ccapshort@umn.edu
Website: https://ccaps.umn.edu/horticulture-masters-degree

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of professional studies in horticulture is designed to enhance the capacity of those currently working in the horticulture industry and to provide the knowledge base needed by others interested in beginning new careers, starting their own business, or pursuing personal interests in horticulture. The degree provides a solid foundation of contemporary horticultural knowledge, yet is flexible enough to allow individuals to focus on the specific skills they wish to hone.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

To be admitted, students must have a bachelor's degree from an accredited post-secondary US institution or its foreign equivalent.

Other requirements to be completed before admission:
Evidence of knowledge of current, introductory, college-level concepts of algebra, chemistry, biology, botany, or plant propagation is required for admission to the program. Prerequisite coursework may be completed at the University of Minnesota or at other accredited institutions of higher education. In all cases, documentation of completed, equivalent coursework combined with professional experience will be considered for application toward fulfillment of the prerequisites for admission to the M.P.S. in Horticulture. A minimum grade of C will be the standard for admission for all prerequisite coursework. Undergraduate prerequisite coursework must come from the following areas: algebra, chemistry, biology, botany, or plant propagation. Please refer to the program website for further details.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, a current resume, two letters of reference, a written statement of purpose (no more than two pages) which addresses pertinent aspects of the student's background and academic qualifications as related to admission to the program and demonstrates a strong interest in horticultural science including documentation of any relevant experiences in the field of horticulture. Application deadlines are in spring for fall semester admission, and in fall for spring semester admission. Refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

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Information current as of November 07, 2022
MELAB
- Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: See department for more details.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Excluding the intro course, capstone course, and courses offered only on the S/N grading basis, a maximum of 3 credits taken S/N may be applied toward the minimum requirements for the degree.

The student's course program must be approved by the DGS.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 30 semester credits required for the degree.

Intro and Capstone (3 credits)

Required introductory and capstone courses for Master of Professional Studies in Horticulture Students.

HORT 6101 - Introduction to the MPS in Horticulture Program (1.0 cr)
HORT 6002 - Problem Solving in Horticulture (2.0 - 3.0 cr)

Required Coursework (3 credits)
Take 3 or more credit(s) from the following:
- ENT 4xxx
- ENT 5xxx
- ENT 8xxx
- PLPA 4xxx
- PLPA 5xxx
- PLPA 8xxx
- SOIL 4xxx
- SOIL 5xxx
- SOIL 8xxx

Horticulture Coursework (15 credits)
15 credits of Horticulture (HORT) courses are required. A maximum of 3 credits of HORT 5090 Directed Studies may be used.
Take 15 or more credit(s) from the following:
- HORT 4xxx
- HORT 5xxx
- HORT 6003 - Masters of Professional Studies in Horticulture Professional Experience Program: Internship (1.0 - 3.0 cr)
- HORT 6011 - Plant Propagation (4.0 cr)
- HORT 6003 - Masters of Professional Studies in Horticulture Professional Experience Program: Internship (1.0 - 3.0 cr)
- HORT 6011 - Plant Propagation (4.0 cr)
- HORT 8xxx

Related Fields Coursework (9 credits)
Select at least 9 credits, such as the following, from related fields coursework offered across the University. Other courses can be selected in consultation with the advisor.
Take 9 or more credit(s) from the following:
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- APS 5101 - Ecological Design for Horticulture (3.0 cr)
- APS 5102 - Garden Design: Theory and Application (2.0 cr)
- APS 5103 - Integration of Sustainable Agriculture Concepts (3.0 cr)
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5021 - Insect Biodiversity and Evolution (4.0 cr)
- ENT 5051 - Scientific Illustration of Insects (3.0 cr)
- ENT 5081 (inactive) (3.0 cr)
- ENT 5121 - Applied Experimental Design (4.0 cr)
- ENT 5341 - Biological Control of Insects and Weeds (3.0 cr)
- ENT 5361 *(Inactive)* (4.0 cr)
- HORT 4xxx
- HORT 5xxx
- HORT 6011 - Plant Propagation (4.0 cr)
- HORT 8xxx
- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 cr)
- PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 8005 - Supervised Classroom or Extension Teaching Experience (1.0 - 2.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- SOIL 4xxx
- SOIL 5xxx
**Human Sexuality Postbaccalaureate Certificate**

**College of Continuing and Professional Studies**

Link to a list of faculty for this program.

**Contact Information:**
Phone: 612-624-4000
Email: ccapsinfo@umn.edu
Website: https://ccaps.umn.edu/human-sexuality-certificate

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Human Sexuality Postbacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human sexuality and associated gender roles and sexual behavior are an integral part of health care, clinical and social sciences, biological sciences, and a determinant of population dynamics and population science. The HIV pandemic, and the prevalence of sexually transmitted infections (STIs) worldwide, make training in human sexuality an essential component of international development, reproductive and population health, and social policy. Sexual health issues are often part of a clinically oriented medical curriculum, and this online certificate broadens human sexuality education to a wider audience across the US and internationally. The Human Sexuality certificate will fulfill part of the requirements towards AASECT certification for sex educators in the components of core knowledge and sexuality education training.

**Program Delivery**
This program is available:
- completely online (all program coursework can be completed online)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelors degree from an accredited post-secondary US institution or an international equivalent.

Other requirements to be completed before admission:
Applications must include:
- resume or CV;
- personal statement (1-2 pages); and
- two academic or professional letters of recommendation.

**Special Application Requirements:**
International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 65

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Information current as of November 07, 2022
- Reading Score: 6.5
- Writing Score: 6.5
- MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students must earn a minimum grade of B- for courses taken on the A/F grading basis.

Required Courses (12 credits)
Take the following courses:
HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
HSEX 6013 - Perspectives and Practices in Sexual Health Education (3.0 cr)
HSEX 6015 - Sexual Pleasure & Intimacy (3.0 cr)
Twin Cities Campus
Integrated Behavioral Health M.P.S.
CCAPS Addiction Studies
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies Information Center, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN, 55108 (612-624-4000)
Email: ccapsinfo@umn.edu
Website: https://ccaps.umn.edu/integrated-behavioral-health-masters-degree

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The high prevalence of co-occurring mental health and substance use disorders virtually guarantees that counselors, no matter the treatment setting, will encounter clients struggling with not one, but two or more disorders.

The master of professional studies in integrated behavioral health (IBH) prepares counselors for this clinical reality. The IBH degree merges mental health and substance abuse education and training into a single, comprehensive and cohesive program. This synthesis represents an important and pioneering shift in the preparation of clinicians.

The IBH is designed to fulfill education and training requirements for two licenses: Licensed Professional Clinical Counselor (LPCC) and Licensed Alcohol and Drug Counselor (LADC).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
- Bachelor's degree from an accredited institution
- Transcripts
- Personal statement
- Two letters of reference
- Updated resume or CV

Special Application Requirements:
International students interested in the master of professional studies in integrated behavioral health should contact the International Student and Scholar Service (http://www.isss.umn.edu) for information on visa status and academic requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 84
Program Requirements

Plan C: Plan C requires 60 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Satisfactory completion of a portfolio demonstrates the student's clinical conceptualization and practice skills through the following:
- A client case study that includes an assessment and treatment plan
- A videotaped treatment session with a mock client
- A philosophy of counseling statement outlining the student's theoretical orientation to counseling and specific applications of their counseling philosophy to the population they intend to serve
- Evaluations outlining areas of competence and skill as assessed by internship site supervisor
- Self-selected papers and projects from program coursework that demonstrate the student's mastery of knowledge and skills

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

In addition to course work, an 880-hour field placement is required to complete the degree. The credit and field placement requirements are designed to fulfill licensing requirements as defined in the Minnesota Statutes, section 148B.54, subdivision 2; and Minnesota Rules, part 2150.2500 to 2150.2660. As noted in the statute, "The national trend for master's programs in counseling is towards 60 semester credits." In order for a practitioner to be eligible for third party reimbursement for services, the practitioner must demonstrate a minimum of 60 semester graduate level credits in counseling coursework.

Students may take one or more courses per term and have up to five years to complete a master's degree. Students who wish to transfer graduate-level coursework from other institutions should contact the Graduate Programs office at ccapsinfo@umn.edu for information and assistance.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 60 semester credits required for the degree.

Foundation Courses (10 credits)
- These should be the first courses students complete. ADDS 5011, 5021, and 5071 are prerequisites for most other courses in the program.
- ADDS 5011 - Foundations in Addiction Studies (2.0 cr)
- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- ADDS 5071 - Foundations of Co-occurring Disorders (2.0 cr)
- IBH 6111 - Research and Evaluation Methods (3.0 cr)

Prerequisites for First Internship (13 credits)
- These courses (along with "Foundation Courses" ADDS 5011, 5021, and 5071) must be completed before students can register for the first internship ADDS 5996.
- ADDS 5031 - Applied Psychopharmacology (2.0 cr)
- ADDS 5041 - Methods and Models I: Motivational Counseling (2.0 cr)
- ADDS 5051 - Methods and Models II: Cognitive Behavioral Therapy (2.0 cr)
- ADDS 5061 - Foundations of Group Work (3.0 cr)
- ADDS 5091 - Assessment and Treatment Planning I (3.0 cr)
- ADDS 5121 - Professional Seminar 1: Internship Prep (1.0 cr)

First Internship (2 credits)
- Two credits (440 field hours) of ADDS 5996 must be completed near the program's mid-way point.
- ADDS 5996 - Internship in Behavioral Health (1.0 cr)

Prerequisites for Second Internship (19 credits)
- All ADDS courses, ADDS 5996, and these courses must be completed before students can register for the second internship IBH 6996.
- ADDS 5081 - Multicultural Foundations of Behavioral Health (3.0 cr)
- IBH 6011 - Foundations in Differential Diagnosis (3.0 cr)
- IBH 6022 - Foundations of Psychological Assessment (2.0 cr)
IBH 6061 - Applied Advanced Diagnostics I (2.0 cr)
IBH 6081 - Human Lifespan Development and Behavioral Health (3.0 cr)
IBH 6121 - Professional Seminar 2: Portfolio Development (1.0 cr)
IBH 6221 - Applications of Counseling Theories (3.0 cr)

Take either IBH 6031 or IBH 6036.
IBH 6031 - Methods and Models IV: Trauma and Anxiety, Assessment and Treatment Intervention (2.0 cr)
or IBH 6036 - Trauma Focused Approaches and Crisis Intervention (2.0 cr)

Second Internship (2 credits)
Two credits (440 field hours) of IBH 6996 must be completed near the end of the program.
IBH 6996 - Internship for Integrated Behavioral Health (1.0 cr)

Additional Required Courses (8 credits)
Additional required courses. Can be taken any time.
IBH 6071 - Advanced Professional Issues: Ethics (3.0 cr)
IBH 6091 - Intersection of Career and Mental Health (2.0 cr)
IBH 6101 - Family Dynamics and Therapy (3.0 cr)

Electives (5 credits)
Electives not on this list must be preapproved.
Take 5 or more credit(s) from the following:
• ADDS 5996 - Internship in Behavioral Health (1.0 cr)
• HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
• HSEX 6013 - Perspectives and Practices in Sexual Health Education (3.0 cr)
• HSEX 6211 - Dimensions of Sexual Functioning (3.0 cr)
• HSEX 6212 - Sex and Relationship Therapy (3.0 cr)
• HSEX 6213 - Sexual Trauma and Trauma Informed Care (3.0 cr)
• IBH 6021 - Methods and Models III: Synthesis Seminar in Client Centered Care (2.0 cr)
• IBH 6031 - Methods and Models IV: Trauma and Anxiety, Assessment and Treatment Intervention (2.0 cr)
• IBH 6032 - Advanced Multicultural Practice (1.0 cr)
• IBH 6036 - Trauma Focused Approaches and Crisis Intervention (2.0 cr)
• IBH 6041 - Prolonged Exposure Therapy for PTSD (2.0 cr)
• IBH 6051 - Advanced Group Practice (2.0 cr)
• IBH 6062 - Applied Advanced Diagnostics II (2.0 cr)
• IBH 6222 - Adolescents and Co-occurring Substance Use and Mental Health Disorders (3.0 cr)
• IBH 6227 - Supervision Models and Methods in Integrated Behavioral Health (3.0 cr)
• IBH 6230 - Clinical Application in Prolonged Exposure Therapy (3.0 cr)
• IBH 6232 - Sexual Health and Gender (3.0 cr)
• IBH 6233 - DBT Skills Training: Group Practices and Treatment Modalities (2.0 cr)
• IBH 6234 - Counseling Grief and Loss (2.0 cr)
• IBH 6910 - Topics in Integrated Behavioral Health (1.0 - 4.0 cr)
• IBH 6993 - Directed Study in Integrated Behavioral Health (1.0 - 3.0 cr)
• IBH 6996 - Internship for Integrated Behavioral Health (1.0 cr)

Portfolio (1 credit)
Required portfolio course.
IBH 6002 - Portfolio Review (1.0 cr)
Twin Cities Campus
Leadership for Science Professionals Postbaccalaureate Certificate
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
CCAPS - Degree and Credit Programs Room 20 Ruttan Hall 604SB 1994 Buford Ave St Paul, MN 55108
Email: ccapsinfo@umn.edu
Website: https://ccaps.umn.edu/online-leadership-certificate-science-professionals

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Leadership for Science Professionals PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Leadership for Science Professionals (LSP) certificate is designed for individuals whether career starters or career advancers seeking the strong foundation in leadership skills necessary for advancement in a wide range of professional science and science-adjacent careers in government, non-profit agencies, international organizations, and corporations. The LSP certificate can be completed as a standalone credential or in conjunction with other University graduate degrees.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Bachelors degree from an accredited post-secondary US institution
A 3.0 minimum GPA is preferred

Applicants will need to submit the following:
Online University application
Online application fee
Resume or CV
Professional Statement (1-2 pages) identifying and articulating career goals as related to the certificate
Two letters of recommendation from academic or professional referees

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Paper Based - Total Score: 563
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 84
• MN Batt

Key to test abbreviations (TOEFL, IELTS, MELAB, MN Batt).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses (12 credits)
Take the following courses:
- ASCL 6312 - Finance for Non-financial Managers (3.0 cr)
- ASCL 6313 - Data for Decision Making (3.0 cr)
- ASCL 6315 - Legal and Ethical Business Issues for Science Professionals (3.0 cr)
Take either ASCL 6314 OR ASCL 6316
- ASCL 6314 - Leading Projects and Teams (3.0 cr)
- or ASCL 6316 - Transformational Leadership in an Intercultural World (3.0 cr)
Twin Cities Campus

Regulatory Affairs for Food Professionals Postbaccalaureate Certificate

CCAPS Graduate Programs Instruction

College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies Information Center 20 Ruttan Hall
1994 Buford Ave St Paul, MN 55108 (612-624-4000)
Email: ccapsinfo@umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Reg Affairs for Food Prof PostBaccalaureate Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Regulatory Affairs for Food Professionals postbaccalaureate certificate is a graduate-level credential that prepares individuals for professional careers in the government sector, non-profit agencies, international organizations, and corporations with more engagement in leadership practices within regulatory affairs. Graduates will be well prepared to contribute and collaborate on problem solving and real solutions.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have a bachelors degree from an accredited post-secondary US institution or an international equivalent.

Applicants with a non-science bachelors degree must also have at least 3 years of related work experience.

Applications must include:
- resume or CV;
- professional statement (1-2 pages articulating career goals as related to the Regulatory Affairs for Food Professionals certificate; and
- two academic or professional letters of recommendation.

Special Application Requirements:
International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://issss.umn.edu/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
MELAB
- Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Required Courses (12 credits)
Take the following courses. A minimum grade of B- must be earned for each course.

ASCL 6212 - Regulatory Affairs for Food Product Development and Market Entry (3.0 cr)
ASCL 6213 - Regulatory Affairs for Food Production and Distribution (3.0 cr)
ASCL 6214 - Regulatory Affairs for Food Claims and Labeling (3.0 cr)
ASCL 6215 - Landmark Food Cases Shifting Regulatory Policy (3.0 cr)
Twin Cities Campus
Sex Therapy Postbaccalaureate Certificate
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
Phone: 612-624-4000
Email: ccapsinfo@umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Sex Therapy Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The 12-credit graduate-level online certificate in Sex Therapy is offered in partnership with the Institute for Sexual and Gender Health, University of Minnesota Medical School.

Program Delivery
This program is available:
* completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have a bachelors degree from an accredited post-secondary US institution or an international equivalent.

Applications must include:
- resume or CV; and
- professional statement (1-2 pages articulating career goals as related to the Sex Therapy certificate.

Optional:
- two academic or professional letters of recommendation.

Special Application Requirements:
International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 65
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students must earn a minimum grade of B- for courses taken on the A-F grading basis.

Required Courses (12 credits)
Select 1 of the following courses in consultation with the advisor:
- HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
- or HSEX 6311 - Introduction to Healthcare for Transgender and Gender Diverse Adults (3.0 cr)

Take the following courses:
- HSEX 6211 - Dimensions of Sexual Functioning (3.0 cr)
- HSEX 6212 - Sex and Relationship Therapy (3.0 cr)
- HSEX 6213 - Sexual Trauma and Trauma Informed Care (3.0 cr)
Twin Cities Campus
Sexual Health M.P.S.
CCAPS Graduate Programs Instruction
College of Continuing and Professional Studies

Link to a list of faculty for this program.

Contact Information:
College of Continuing and Professional Studies Information Center 20 Ruttan Hall
1994 Buford Ave St Paul, MN 55108 (612-624-4000)
Email: ccapsinfo@umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Professional Studies (MPS) in Sexual Health provides a broad overview of the human sexuality field in addition to current, evidence-based practices that prepares students for careers as sex therapists or sex educators. Components of the curriculum are accepted by the American Association of Sex Educators, Counselors, and Therapists (AASECT) toward certification.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have a bachelors degree from an accredited post-secondary US institution or an international equivalent.

Applications must include:
- resume or CV;
- professional statement (1-2 pages) articulating reasons for pursuing the Sexual Health MPS and highlighting demonstrated commitment to the field of human sexuality (e.g., previous study, work, volunteer service, professional organizational involvement); and
- two academic or professional letters of recommendation.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 65
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students must earn a minimum grade of B- for courses taken on the A-F grading basis.

Human Sexuality Core Courses (12 credits)
Take the following courses:
- HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
- HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
- HSEX 6013 - Perspectives and Practices in Sexual Health Education (3.0 cr)
- HSEX 6015 - Sexual Pleasure & Intimacy (3.0 cr)

Elective Courses (6 credits)
Select courses in consultation with the advisor to meet the 6-credit electives requirement.
- IBH 6232 - Sexual Health and Gender (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Sex Therapy
Sex Therapy Courses (12 credits)
Take the following courses to complete the 30-credit minimum:
- HSEX 6211 - Dimensions of Sexual Functioning (3.0 cr)
- HSEX 6212 - Sex and Relationship Therapy (3.0 cr)
- HSEX 6213 - Sexual Trauma and Trauma Informed Care (3.0 cr)
- HSEX 6311 - Introduction to Healthcare for Transgender and Gender Diverse Adults (3.0 cr)
Advanced Wearable Products Post-Baccalaureate Certificate

Design, Housing & Apparel
College of Design

Twin Cities Campus

Link to a list of faculty for this program.

Contact Information:
240 McNeal Hall, 1985 Buford Ave, St. Paul, MN 55108
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- N/A
- Degree: Advanced Wearable Products PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Advanced Wearable Products certificate is a supplemental curriculum intended to provide and deepen interdisciplinary skills and knowledge related to the design, development, and assessment of wearable functional products including wearable technology, functional clothing, and personal protective equipment.

Accreditation
This program is accredited by N/A

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Required: undergraduate degree in a related discipline.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Coursework (12 credits)
Select at least 12 credits, in consultation with the director of graduate studies, from the following list. DES 5901 can be taken as a stand-alone course; however, if DES 5902 is chosen, it must be taken concurrently with DES 5901.
- DES 5185 - Human Factors in Design (3.0 cr)
- APST 5224 - Functional Clothing Design (4.0 cr)
- DES 8151 - Product Development: Theory and Practice (3.0 cr)
- ADES 4196 - Internship in Apparel Design (1.0 - 4.0 cr)
- DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
- DES 5901 - Principles of Wearable Technology (2.0 cr)
- DES 5902 - Wearable Technology Laboratory Practicum (2.0 cr)
Twin Cities Campus
Architecture M.Arch.
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
School of Architecture, College of Design, University of Minnesota, 145 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455
(612-624-7866; fax: 624-5743)
Website: https://design.umn.edu/academics/programs/about-architecture

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 59 to 90
- This program does not require summer semesters for timely completion.
- Degree: Master of Architecture

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Architecture encompasses the making and study of the buildings and environments that we inhabit. The concerns of architecture involve a wide variety of areas of study, including the art of representing built projects through drawings and computer graphics; the technology of building structure, building materials, and natural and mechanical systems; the history, theory, and art of making, using, and understanding buildings as cultural artifacts for human use; and the practice of architecture in the context of sustainable environmental systems, urban form, and business economics.

The master's of architecture degree is the accredited three-year professional program that prepares students for licensure and practice in the discipline of architecture as a speculative, analytic, and investigative endeavor. Through rigorous methods of inquiry developed in the design studio, lectures, and seminars students acquire the breadth of knowledge required of the professional architect, including: the techniques and processes of representation, communication, and analysis; the history and theory of making architecture and urban form for human use; and the technology, systems, processes, and economics of construction and practice. The 90-credit M.Arch. professional degree program is accredited by the National Architectural Accrediting Board (NAAB). A portfolio for admission is required.

The M.Arch. program is designed to provide rigorous training in the areas of materials and media literacy, stewardship of the built and natural environment, and systemic, urban-scale thinking. M.Arch. students take required coursework in the areas of design studio, building technology, building structures (statics), structural engineering systems (applications), environmental systems, advanced building technology/integrated building systems, technical applications in design, architectural history, design theory, and catalyst workshops. The required curriculum includes integrated design/technology coursework such as the second year graduate design studio + building structures; a net-positive design studio with a focus on daylighting, solar design, and energy conservation in buildings; an advanced studio focused on urban and landscape systems; a two-part global and cultural history sequence; and a Masters Final Project developed independently by the student. Computer tools and applications as well as analog modes of critical representation are incorporated into the design studio sequence.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 59 to 90 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The Master's Final Project is a 10-credit studio-based design exploration under the supervision of a studio faculty mentor.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Advanced placement into the second year is possible for students with a Bachelor of Science or other pre-professional degree and excellent English language proficiency.

Required Coursework (61 credits)
Take the following required courses for a total of 61 credits:

ARCH 5411 - Principles of Design Theory (3.0 cr)
ARCH 5412 - Architecture: A Global and Cultural History (3.0 cr)
ARCH 5561 - Tech 1, Structures for Building (3.0 cr)
ARCH 5562 - Tech 2, Intro to Building Technology (3.0 cr)
ARCH 5563 - Tech 3: Advanced Building Technology Integrated Building Systems (3.0 cr)
ARCH 5564 - Tech 4: Building Structural Systems (3.0 cr)
ARCH 5621 - Professional Practice in Architecture (3.0 cr)
ARCH 8251 - Graduate Architectural Design I (9.0 cr)
ARCH 8253 - Graduate Architectural Design III (6.0 cr)
ARCH 8255 - Graduate Architectural Design V (6.0 cr)
ARCH 8299 - Master's Final Project (10.0 cr)
ARCH 5518 - Environmental Technology: Integrative Ecological Design for Responsive Architecture (3.0 cr)
ARCH 5413 - Modern and Contemporary Global Architecture (3.0 cr)
ARCH 8254 - Technical Applications in Design (3.0 cr)

Project Modules (9 credits)
Take 9 credits (3 courses) from the following:

ARCH 5250 - Advanced Topics in Design (1.0 - 6.0 cr)

Catalysts (2 credits)
Take the following course twice for a total of 2 credits:

ARCH 5110 - Architecture as Catalyst (1.0 cr)

Electives (18 credits)
Take 18 credits of Architecture electives. At least 3 credits must be in ARCH 54xx or 84xx.

ARCH 5xxx
ARCH 8xxx

Advanced Standing (59 credits)
Students with a bachelor of science in architecture may be eligible for a waiver of the required first-year coursework.

Required Courses (40 credits)
Take the following courses for 40 credits:

ARCH 5563 - Tech 3: Advanced Building Technology Integrated Building Systems (3.0 cr)
ARCH 5564 - Tech 4: Building Structural Systems (3.0 cr)
ARCH 5621 - Professional Practice in Architecture (3.0 cr)
ARCH 8253 - Graduate Architectural Design III (6.0 cr)
ARCH 8255 - Graduate Architectural Design V (6.0 cr)
ARCH 8299 - Master's Final Project (10.0 cr)
ARCH 8254 - Technical Applications in Design (3.0 cr)
ARCH 5411 - Principles of Design Theory (3.0 cr)
ARCH 5413 - Modern and Contemporary Global Architecture (3.0 cr)

Project Modules (3 credits)
Take one of the following courses once for 3 credits:
ARCH 5250 - Advanced Topics in Design (1.0 - 6.0 cr)
or ARCH 8250 - Advanced Topics in Design (1.0 - 6.0 cr)

Catalysts (1 credit)
Take the following course for 1 credit:
ARCH 5110 - Architecture as Catalyst (1.0 cr)

Electives (15 credits)
Take 15 credits of Architecture electives. At least 3 credits must be in ARCH 54xx or 84xx.
Arch 5xxx
Arch 8xxx

Joint- or Dual-degree Coursework: M.Arch/M.S.-Architecture Student may take a total of 24 credits in common among the academic programs.
Twin Cities Campus
Architecture M.S.
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
School of Architecture, University of Minnesota, 145 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-624-7866; fax: 612-624-5743)
Website: https://design.umn.edu/academics/programs/about-architecture

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Architecture offers four distinct master of science in architecture degrees:

1) MS in architecture, sustainable design track (plan A or B);
2) MS in architecture, heritage conservation and preservation track (plan A or B);
3) MS in architecture, metropolitan design track (plan A, B, or C); and,
4) MS in architecture, research practices track (plan C only).

Each of the above has its own unique application requirements, prerequisites, and curriculum structure. Prospective applicants are encouraged to consult the degree programs section of the School of Architecture website for additional information: http://arch.design.umn.edu. Students who successfully complete the a master of science in architecture degree are eligible to receive 936 hours of IDP credit that is 17% of the 5,600 hours of mandatory internship for registration as an architect. To receive the IDP credit, the MS degree must be earned after receiving the M.Arch degree. The MS metropolitan design track requires summer semester coursework. The other three MS tracks do not require summer semester work.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Each of the master of science in architecture programs has its own unique application requirements, prerequisites, and curriculum structure. Prospective applicants are encouraged to consult the degree programs section of the School of Architecture website for additional information: http://arch.design.umn.edu.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
- MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.
Plan B: Plan B requires 27 to 28 major credits and 6 credits outside the major. The final exam is oral.

Plan C: Plan C requires 24 to 30 major credits and 0 to 6 credits outside the major. The final exam is oral. This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Joint- or Dual-degree Coursework: M.Arch/MS-ArchitectureMLA/MS-ArchitectureStudent may take a total of 24 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Sustainable Design
This sub-plan is limited to students completing the program under Plan A or Plan B.

The sustainable design track of the MS admits from diverse design and environmental backgrounds. Candidates for the program include, practicing design professionals, architecture graduate students, engineering and environmental science professionals, and related disciplines. Ideal applicants will have a clear sustainable design research agenda, experience in environmental design or design production, and a desire to develop new knowledge in the sustainable design field.

The sustainable design track’s goals are to foster sustainable design education, research, and practice and to create a significant positive impact on sustainable design in the region and nation. It will achieve these goals by providing courses and research opportunities that:

- Promote excellence and innovations in regional and global ecological design practice and research.
- Contribute to the evolving and emerging sustainable design practice and research knowledge base, which includes ecological, environmental, social, and economic issues and impacts.
- Provide architectural designers and researchers with qualitative and quantitative knowledge, methods, and tools to implement sustainable design in professional practice.

Required Coursework
Take the following courses for a total of 12 credits:
- ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
- ARCH 8567 - Site and Water Issues in Sustainable Design (3.0 cr)
- ARCH 8563 - Energy and Indoor Environmental Quality Issues in Sustainable Design (3.0 cr)
- ARCH 8565 - Materials Performance in Sustainable Building (3.0 cr)

Architecture Electives
Take at least 6 ARCH elective credits, in consultation with the advisor or director of graduate studies.
- ARCH 5211 - Material Investigation: Concrete (4.0 cr)
- ARCH 5523 (Inactive) (4.0 cr)
- ARCH 5527 - Material Investigations: Stone and Water (4.0 cr)
- ARCH 5541 (Inactive) (3.0 cr)

Electives Outside Architecture
Take at least 6 credits outside the major, in consultation with the advisor or director of graduate studies.
- SSM 5616 - Building Science I: Fundamentals (4.0 cr)
- DES 5168 - Evidence-Based Design (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
- ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
- ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
- ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
- ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
- HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
- LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
- LA 5514 - Making the Mississippi (3.0 cr)
- PA 5211 - Land Use Planning (3.0 cr)
- PA 5253 (Inactive) (3.0 cr)
- PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)

Plan A or Plan B

Plan A Requirement
Take 10 master's thesis credits.
ARCH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or

Plan B Requirement
Take at least 10 additional credits, in consultation with the advisor or director of graduate studies.
ARCH 5521 - Material Investigation: Concrete (4.0 cr)
ARCH 5523 *(Inactive)* (4.0 cr)
ARCH 5527 - Material Investigations: Stone and Water (4.0 cr)
ARCH 5541 *(Inactive)* (3.0 cr)
SSM 5616 - Building Science I: Fundamentals (4.0 cr)
DES 5168 - Evidence-Based Design (3.0 cr)
ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5253 *(Inactive)* (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5511 - Community Economic Development (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)

Heritage Conservation & Preservation

This sub-plan is limited to students completing the program under Plan A or Plan B.

The heritage conservation and preservation track of the Architecture MS offers courses and research opportunities in the study of the preservation of historic buildings, districts, and landscapes, as well as the design and management of cultural heritage sites. The track explores heritage on several distinct but related levels. It examines the materiality of heritage resources through documentation, diagnosis, and the design of treatment interventions. It also encourages critical analysis and assessment of the cultural values that underlie and define preservation policies, laws, and professional norms. Through fieldwork, case studies, and courses that investigate regional, national, and global heritage, the track focuses on the philosophy, policy, technology, economics, and social implications of heritage preservation.

Required Coursework
Take the following courses for a total of 6 credits:

ARCH 5671 - Historic Preservation (3.0 cr)
ARCH 5673 - Historic Property Research and Documentation (3.0 cr)

Heritage Conservation and Preservation Electives
Take 2 courses from the following list for at least 6 credits:
ARCH 5410 - Topics in Architectural History (3.0 cr)
ARCH 5411 - Principles of Design Theory (3.0 cr)
ARCH 5412 - Architecture: A Global and Cultural History (3.0 cr)
ARCH 5670 - Topics in Historic Preservation (1.0 - 3.0 cr)
ARCH 5672 - Historic Building Conservation (3.0 cr)
ARCH 5674 - World Heritage Conservation (3.0 cr)
ARCH 5676 - Economics of Heritage Preservation (3.0 cr)
ARCH 5677 *(Inactive)* (3.0 cr)
ARCH 5678 *(Inactive)* (3.0 cr)

Architecture Electives
Take at least 6 ARCH elective credits, in consultation with the advisor or director of graduate studies.
ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
ARCH 4435 - History of American Architecture (3.0 cr)
ARCH 5609 - Development and Implementation of Research (3.0 cr)

Electives Outside Architecture
Take at least 6 credits outside the major, in consultation with the advisor or director of graduate studies.

ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5253 *(Inactive)* (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5511 - Community Economic Development (3.0 cr)
PA 5221 - Private Sector Development (3.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
MST 5012 - Museum Practices (3.0 cr)

Plan A or Plan B

Plan A Requirement
Take 10 master's thesis credits.
ARCH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B Requirement
Take an additional 9 to 10 credits, in consultation with the advisor or director of graduate studies.
ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
ARCH 5435 - History of American Architecture (3.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5253 *(Inactive)* (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5511 - Community Economic Development (3.0 cr)
PA 5221 - Private Sector Development (3.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
MST 5012 - Museum Practices (3.0 cr)

Metropolitan Design
This sub-plan is limited to students completing the program under Plan A, Plan B, or Plan C.

The metropolitan design track of the architecture MS is an advanced program intended for individuals who are keenly interested in the study of cities and their metropolitan regions. The track combines strong design instruction supported by applied research courses in urban design history and theory. The objective is to train students to work across a large range of urban scales and become familiar with the social, ecological, economic, and political interactions that eventually shape the quality of city living. It is open to professionals from the design disciplines and provides concurrent options for graduate students enrolled in the M.Arch and MLA professional programs. Concurrent students must graduate from the Architecture MS (metropolitan design track) after they have successfully completed their professional programs.

Required Coursework
Take the following courses for a total of 12 credits:
ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
ARCH 5721 - Case Studies in Urban Design (3.0 cr)
ARCH 8255 - Graduate Architectural Design V (6.0 cr)

Electives Outside Architecture
Take at least 6 credits outside the major, in consultation with the advisor or director of graduate studies.
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5511 - Community Economic Development (3.0 cr)
HSG 5467 - Housing and the Social Environment (4.0 cr)
HSG 5463 - Housing Policy (3.0 cr)
LA 5405 - Interdisciplinary Studies in Landscape Architecture (1.0 - 6.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PA 5723 - Water Policy (3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5212 - Managing Urban Growth and Change (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5261 - Housing Policy (3.0 cr)

Remaining Electives
Take elective credits from the following list, in consultation with the advisor or director of graduate studies, to meet minimum major and total course credit requirements:

- ARCH 5410 - Topics in Architectural History (3.0 cr)
- ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
- ARCH 5731 - Territorial City (3.0 cr)
- ARCH 5671 - Historic Preservation (3.0 cr)
- ARCH 5361 (Inactive) (3.0 cr)
- ARCH 5750 - Topics in Urban Design (1.0 - 4.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- HSG 5467 - Housing and the Social Environment (4.0 cr)
- LA 5405 - Interdisciplinary Studies in Landscape Architecture (1.0 - 6.0 cr)
- ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- PA 5721 - Energy Systems and Policy (3.0 cr)
- PA 5722 - Economics of Environmental Policy (3.0 cr)
- PA 5723 - Water Policy (3.0 cr)
- PA 5211 - Land Use Planning (3.0 cr)
- PA 5212 - Managing Urban Growth and Change (3.0 cr)
- PA 5231 - Transit Planning and Management (3.0 cr)
- PA 5261 - Housing Policy (3.0 cr)

**Plan A Requirements**

Take 10 master's thesis credits.

- ARCH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Research Practices**

This sub-plan is limited to students completing the program under Plan C.

The Research Practices track addresses two goals: providing a structured path to licensure totaling seven years, and integrating research with practice.

MS-RP students are required to maximize their progress toward completing the Architectural Experience Program (AXP) during their MS program. This means work in a firm or other AXP setting is required while enrolled in the program, including each semester and summer between semesters. Exceptions will be made for extraordinary circumstances (such as grant-funded research or personal situation).

**Required Coursework**

Take the following courses for a total of 18 credits:

- ARCH 5609 - Development and Implementation of Research (3.0 cr)
- ARCH 5621 - Professional Practice in Architecture (3.0 cr)
- ARCH 5651 - Building Stories (3.0 cr)
- ARCH 5686 - Research Practices Final Project: Research into Practice (4.0 cr)
- ARCH 5687 - Research Practices Final Project: Practice into Research (4.0 cr)
- ARCH 5688 - Research Practices Final Project: Representation of Case Studies (1.0 cr)

**Required Practicum**

Take the following course twice:

- ARCH 5630 - Practicum: Advanced Issues in Practice (3.0 cr)

**Electives**

Take two 3-credit elective courses from architecture or non-architecture offerings, in consultation with the adviser or director of graduate studies.

- ARCH 5xxx
- ARCH 8xxx
- xxxx 5xxx
- xxxx 6xxx
- xxxx 7xxx
- xxxx 8xxx
Twin Cities Campus
Design M.A.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify a track and degree objective.

Formal tracks are:
Apparel studies (including dress, history, and culture; product development; and retail and consumer studies)
Graphic design
Interior design

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

 Eligibility requirements vary by track. Requirements by track are available on the College of Design website - https://design.umn.edu/

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
catalog website.

Program Requirements

Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

Design Program Core Requirements

DES 8181 - Research Ethics (1.0 cr)

Related Field Coursework

Students are required to take a minimum of 6 credits in a related field. Courses are selected with the approval of the advisor and committee.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Apparel Studies

The Apparel Studies track advances both theoretical knowledge and applications for textile and apparel products and their relationship to human behavior using a design lens. Students may focus on product development; dress, history, and culture; or retail and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis. The MA degree is focused on the arts and humanities and is appropriate for the dress, history, and culture emphasis.

Evaluation and Analysis Coursework (6 credits)

Students are required to take a minimum of 6 credits in evaluation and analysis. Other courses may be taken with approval from the advisor and committee.

DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Concentration

Dress, History, and Culture

Theory and Philosophy Coursework (3 credits)

Students take a minimum of 3 credits in this category.

DES 8112 - Design Theory (3.0 cr)
orDES 8164 - Innovation Theory and Analysis (3.0 cr)

Plan A Requirements (8 credits)

Take 8 or more credit(s) from the following:
- APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
- APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- APST 8268 - Behavioral Aspects of Dress (3.0 cr)
- DES 5165 - Design and Globalization (3.0 cr)
- DES 8112 - Design Theory (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)

• Thesis credits
Students take a minimum of 10 thesis credits.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B Requirements (15 credits)
Take 15 or more credit(s) from the following:
• APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)
• DES 5165 - Design and Globalization (3.0 cr)
• DES 8112 - Design Theory (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)

• Plan B Master's Project (3 credits)
Students are required to register for Plan B Master's Project in the last semester of the program.
• APST 8222 - Plan B Master's Project (3.0 cr)

-OR-

Product Development
Theory and Philosophy Coursework (3 credits)
Students take a minimum of 3 credits in this category.
• DES 8112 - Design Theory (3.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)

Plan A Requirements (8 credits)
Take 8 or more credit(s) from the following:
• APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• APST 5224 - Functional Clothing Design (4.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development: Theory and Practice (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)

• Thesis Credits
Students take a minimum of 10 thesis credits.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B Requirements (15 credits)
Take 15 or more credit(s) from the following:
• APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• APST 5224 - Functional Clothing Design (4.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development: Theory and Practice (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)

• Plan B Master's Project (3 credits)
Students are required to register for Plan B Master's Project in the last semester of the program.
- **APST 8222** - Plan B Master's Project (3.0 cr)

- **OR-**

**Retail and Consumer Studies**

**Theory and Philosophy Coursework (3 credits)**
- **APST 8272** - Digital Consumers: Theories in Retail and Consumer Studies (3.0 cr)

**Plan A Requirements (8 credits)**
Take 8 or more credits from the following:
- **APST 5117** - Retail Environments and Human Behavior (3.0 cr)
- **APST 5123** - Living in a Consumer Society (3.0 cr)
- **APST 5193** - Directed Study in Apparel Studies (1.0 - 4.0 cr)
- **APST 8192** - Readings in Apparel Studies (1.0 - 3.0 cr)
- **APST 8193** - Directed Study (1.0 - 3.0 cr)
- **APST 8268** - Behavioral Aspects of Dress (3.0 cr)
- **APST 8271** - Retailing: Strategic Perspectives (3.0 cr)
- **DES 8113** - Teaching and Assessment (2.0 cr)
- **DES 8115** - Grant Writing (2.0 cr)
- **DES 8151** - Product Development: Theory and Practice (3.0 cr)
- **DES 8166** - Material Culture and Design (3.0 cr)
- **DES 8167** - Aesthetics of Design (3.0 cr)

**Thesis Credits**
Students take a minimum of 10 thesis credits.
- **DES 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B Requirements (15 credits)**
Take 15 or more credits from the following:
- **APST 5117** - Retail Environments and Human Behavior (3.0 cr)
- **APST 5123** - Living in a Consumer Society (3.0 cr)
- **APST 5193** - Directed Study in Apparel Studies (1.0 - 4.0 cr)
- **APST 8192** - Readings in Apparel Studies (1.0 - 3.0 cr)
- **APST 8193** - Directed Study (1.0 - 3.0 cr)
- **APST 8268** - Behavioral Aspects of Dress (3.0 cr)
- **APST 8271** - Retailing: Strategic Perspectives (3.0 cr)
- **DES 8113** - Teaching and Assessment (2.0 cr)
- **DES 8115** - Grant Writing (2.0 cr)
- **DES 8151** - Product Development: Theory and Practice (3.0 cr)
- **DES 8166** - Material Culture and Design (3.0 cr)
- **DES 8167** - Aesthetics of Design (3.0 cr)

**Graphic Design**
The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; data visualization; and interactive design. Completion of the UX MasterTrack Certificate, prior to admission, may apply towards the Graphic Design subplan/track requirements. Student will need to consult with the DGS for approval. Visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertracktm-certificate for more information.

**Theory and Philosophy Coursework (3 credits)**
Select one of the following:
- **DES 8112** - Design Theory (3.0 cr)
- **DES 8164** - Innovation Theory and Analysis (3.0 cr)

**Evaluation and Analysis Coursework (6 credits)**
Students take a minimum of 6 credits in this category.
- **DES 8102** - Quantitative Research Methods (3.0 cr)
- **DES 8103** - Qualitative and Mixed Methods Research (3.0 cr)
- **GDES 5388** - Graphic Design Research (3.0 cr)

**Plan Options**

**Plan A Requirements (7 credits)**
Take 2 or more course(s) from the following:

**Required Course**
Take the following course:
• DES 8114 - Design Studio (4.0 cr)

**Required Coursework**
Select one of the following:
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- or GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

**Electives**
Take additional courses as needed to complete 24 units of major coursework.
Take 0 or more course(s) from the following:
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5193 - Directed Study in Graphic Design (1.0 - 4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interaction Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data & Information Visualization (3.0 cr)
- GDES 5383 - Digital Illustration and Animation (3.0 cr)
- GDES 5386 - Fundamentals of Game Design (3.0 cr)
- GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
- GDES 8193 - Directed Study (1.0 - 3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

**Thesis Credits**
Take 10 or more credit(s) from the following:
- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B Requirements (15 credits)**
Take 15 or more credit(s) from the following:

**Required Course**
Take the following course:
- DES 8114 - Design Studio (4.0 cr)

Select one of the following:
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- or GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

**Electives (8 credits)**
Take 8 or more credit(s) from the following:
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5193 - Directed Study in Graphic Design (1.0 - 4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interaction Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data & Information Visualization (3.0 cr)
- GDES 5383 - Digital Illustration and Animation (3.0 cr)
- GDES 5386 - Fundamentals of Game Design (3.0 cr)
- GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
- GDES 8193 - Directed Study (1.0 - 3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

**Plan B Master's Project (3 credits)**
Students are required to register for Plan B Master's Project in the last semester of the program.
Take 3 or more credit(s) from the following:
- GDES 8222 - Plan B Master's Project (3.0 cr)

**Interior Design**
Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including culture, sustainability, and issues facing design education. Advances in theoretical knowledge and study of the interactions of humans in interior environments prepare students for teaching and research positions as well as specializations within the professions. A prior degree in interior design or architecture is required for admission to the study interior design at the graduate level.

**Theory and Philosophy Coursework (3 credits)**
Select one of the following:
DES 8112 - Design Theory (3.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)
or DES 8166 - Material Culture and Design (3.0 cr)

Evaluation and Analysis Coursework (6 credits)
Students should take a minimum of six credits. Statistics course is required and either DES 8102 or DES 8103.
Take 6 or more credit(s) from the following:
• DES 8102 - Quantitative Research Methods (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Concentration (8 credits)
Take 8 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• DES 5168 - Evidence-Based Design (3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• IDES 8192 - Readings in Interior Design (1.0 - 3.0 cr)
• IDES 8193 - Directed Study (1.0 - 3.0 cr)
• Thesis Credits
  Students take a minimum of 10 credits in this category.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Design M.F.A.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify the track and degree objective.

The MFA is available in the graphic design track only.

The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; data visualization; and interactive design.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements vary by track. Requirements by track are available on the track pages of the design graduate program website: https://design.umn.edu/

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 52 major credits and 8 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: MFA coursework and research culminates in a creative thesis, which includes a paper and extensive creative project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee. Completion of the UX MasterTrack Certificate, prior to admission, may apply towards degree requirements. Student will need to consult with the DGS for approval. Visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertracktm-certificate for more information.

Design Program Core Requirement

DES 8181 - Research Ethics (1.0 cr)

Related Field

Students are required to take a minimum of 8 credits in a related field. Courses are selected with the approval of the advisor and committee.

Theory and Philosophy

Take 6 or more credit(s) from the following:
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)

Evaluation and Analysis

Take 6 or more credit(s) from the following:
- GDES 5388 - Graphic Design Research (3.0 cr)
- DES 8102 - Quantitative Research Methods (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Required Additional

DES 8114 - Design Studio (4.0 cr)
GDES 8361 - Color, Design, and Human Perception (3.0 cr)
GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

MFA Creative Thesis Credits

Take 12 credits or more of the following:
GDES 8990 - MFA Creative Thesis (6.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Graphic Design

Graphic Design Requirements

Take 17 or more credit(s) from the following:
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5193 - Directed Study in Graphic Design (1.0 - 4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interaction Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data & Information Visualization (3.0 cr)
• GDES 5383 - Digital Illustration and Animation (3.0 cr)
• GDES 5386 - Fundamentals of Game Design (3.0 cr)
• GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
• GDES 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)
Twin Cities Campus
Design M.S.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34 to 37
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify a track and degree objective.

Formal tracks are:
Apparel studies (including dress, history, and culture; product development; and retail and consumer studies
Graphic design
Interior design
Product design

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
For specific application requirements, including eligibility requirements for each track, see: https://design.umn.edu/

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

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Information current as of November 07, 2022
Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 18 to 21 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral.

Plan C: Plan C requires 28 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

Design Program Core Requirement (1 credit)
Take the following course:
DES 8181 - Research Ethics (1.0 cr)

Related Field Coursework (6 credits)
Select at least 6 credits in a related field in consultation with the advisor and committee.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Apparel Studies
This sub-plan is limited to students completing the program under Plan A or Plan B.

Evaluation and Analysis Coursework (6 credits)
Take the following courses, or other coursework with the approval of the advisor and committee, to meet the 6-credit requirement:
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Concentration

Dress, History, and Culture

Theory and Philosophy Coursework (3 credits)
Select one of the following courses in consultation with the advisor and committee:
DES 8112 - Design Theory (3.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)

Plan A Electives (8 credits)
Take at least 8 credits from the following in consultation with the advisor and committee:
APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
APST 8268 - Behavioral Aspects of Dress (3.0 cr)
DES 5165 - Design and Globalization (3.0 cr)
DES 8112 - Design Theory (3.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8164 - Innovation Theory and Analysis (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)

**Thesis credits**
Plan A students take a minimum of 10 thesis credits.
DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**or Plan B Electives (15 credits)**
Select 15 credits from the following in consultation with the advisor and committee:
APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
APST 8268 - Behavioral Aspects of Dress (3.0 cr)
DES 5165 - Design and Globalization (3.0 cr)
DES 8112 - Design Theory (3.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8164 - Innovation Theory and Analysis (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)

**Plan B Master's Project (3 credits)**
Students are required to register for Plan B Master's Project in the last semester of the program. Take the following course in consultation with the advisor and committee.
APST 8222 - Plan B Master's Project (3.0 cr)

-OR-

**Product Development**

**Theory and Philosophy Coursework (3 credits)**
Take one of the following courses in consultation with the advisor and committee:
DES 8112 - Design Theory (3.0 cr)

**or DES 8164 - Innovation Theory and Analysis (3.0 cr)**

**Plan A Electives (8 credits)**
Take at least 8 credits from the following in consultation with the advisor and committee:
APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
APST 5224 - Functional Clothing Design (4.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
DES 5185 - Human Factors in Design (3.0 cr)
DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8114 - Design Studio (4.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8151 - Product Development: Theory and Practice (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)
GDES 8361 - Color, Design, and Human Perception (3.0 cr)

**Thesis Credits**
Plan A students take a minimum of 10 thesis credits.
DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**or Plan B Electives (15 credits)**
Select 15 credits from the following in consultation with the advisor and committee:
APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
APST 5224 - Functional Clothing Design (4.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
DES 5185 - Human Factors in Design (3.0 cr)
DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8114 - Design Studio (4.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8151 - Product Development: Theory and Practice (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)
Plan B Master's Project (3 credits)
Students are required to register for Plan B Master's Project in the last semester of the program. Take the following course in consultation with the advisor and committee.

APST 8222 - Plan B Master's Project (3.0 cr)

-OR-

Retail and Consumer Studies

Theory and Philosophy Coursework (3 credits)
Take the following course:

APST 8272 - Digital Consumers: Theories in Retail and Consumer Studies (3.0 cr)

Plan A Electives (8 credits)
Take at least 8 credits from the following in consultation with the advisor and committee:

APST 5117 - Retail Environments and Human Behavior (3.0 cr)
APST 5123 - Living in a Consumer Society (3.0 cr)
APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
APST 8268 - Behavioral Aspects of Dress (3.0 cr)
APST 8271 - Retailing: Strategic Perspectives (3.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8151 - Product Development: Theory and Practice (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)

Thesis Credits
Plan A students take a minimum of 10 thesis credits.

DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or

Plan B Electives (15 credits)
Select 15 credits from the following in consultation with the advisor and committee:

APST 5117 - Retail Environments and Human Behavior (3.0 cr)
APST 5123 - Living in a Consumer Society (3.0 cr)
APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
APST 8268 - Behavioral Aspects of Dress (3.0 cr)
APST 8271 - Retailing: Strategic Perspectives (3.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8151 - Product Development: Theory and Practice (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)

Plan B Master's Project (3 credits)
Students are required to register for Plan B Master's Project in the last semester of the program. Take the following course in consultation with the advisor and committee.

APST 8222 - Plan B Master's Project (3.0 cr)

Graphic Design
This sub-plan is limited to students completing the program under Plan A or Plan B.

Completion of the UX MasterTrack Certificate, prior to admission, may apply towards the Graphic Design subplan/track requirements. Student will need to consult with the DGS for approval. Visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertrack-certificate for more information.

Theory and Philosophy Coursework (3 credits)
Take one of the following courses in consultation with the advisor and committee.

DES 8112 - Design Theory (3.0 cr)
DES 8164 - Innovation Theory and Analysis (3.0 cr)

Evaluation and Analysis Coursework (6 credits)
Select two courses from the following in consultation with the advisor and committee.

DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
GDES 5388 - Graphic Design Research (3.0 cr)

Graphic Design Requirements (7 credits)

DES 8114 - Design Studio (4.0 cr)
Select at least one of the following courses in consultation with the advisor and committee. Take 0 or more course(s) from the following:

- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

Plan Options

Plan A Electives
Take additional courses, as needed, to complete 24 credits of major coursework.

- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5193 - Directed Study in Graphic Design (1.0 - 4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interaction Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data & Information Visualization (3.0 cr)
- GDES 5383 - Digital Illustration and Animation (3.0 cr)
- GDES 5386 - Fundamentals of Game Design (3.0 cr)
- GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
- GDES 8193 - Directed Study (1.0 - 3.0 cr)

Thesis Credits
Plan A students take a minimum of 10 thesis credits. Take 10 or more credit(s) from the following:

- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Electives (8 credits)
Select 8 credits from the following in consultation with the advisor and committee.

- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5193 - Directed Study in Graphic Design (1.0 - 4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interaction Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data & Information Visualization (3.0 cr)
- GDES 5383 - Digital Illustration and Animation (3.0 cr)
- GDES 5386 - Fundamentals of Game Design (3.0 cr)
- GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
- GDES 8193 - Directed Study (1.0 - 3.0 cr)

Plan B Master's Project (3 credits)
Students are required to register for Plan B Master's Project in the last semester of the program. Take the following course in consultation with the advisor and committee.

Take exactly 3 credit(s) from the following:

- GDES 8222 - Plan B Master's Project (3.0 cr)

Interior Design
This sub-plan is limited to students completing the program under Plan A.

Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including culture, sustainability, and issues facing design education. Advances in theoretical knowledge and study of the interactions of humans in interior environments prepare students for teaching and research positions as well as specializations within the professions. A prior degree in interior design or architecture is required for admission to the study interior design at the graduate level.

Theory and Philosophy Coursework (3 credits)
Select one of the following courses in consultation with the advisor and committee:

- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)
- DES 8166 - Material Culture and Design (3.0 cr)

Evaluation and Analysis Coursework (6 credits)
Select at least one statistics course, and select either DES 8102 or 8103, in consultation with the advisor:
Product Design
This sub-plan is limited to students completing the program under Plan A or Plan C.

The product design track is creative and interdisciplinary, blending elements of industrial design, engineering, business, and humanities. Combining these disciplines gives you the tools and methods to design products and services (both physical and digital) that are functional, marketable, and human-centered. Our flexible programming gives you the option to deepen your theoretical and practical knowledge of product design and gain hands-on advanced product design experience to augment your background.

Theory and Philosophy Coursework (3 credits)
Select one of the following courses in consultation with the advisor and committee:
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)

Plan Options

Plan A Coursework
Evaluation and Analysis (3 credits)
Select one of the following in consultation with the advisor and committee:
- DES 8102 - Quantitative Research Methods (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
Core Coursework (14 credits)
Take the following courses:
- PDES 5701 - User-Centered Design Studio (4.0 cr)
- PDES 5702 - Visual Communication (3.0 cr)
- PDES 5703 - Prototyping Methods (4.0 cr)
- PDES 5704 - Computer-Aided Design Methods (3.0 cr)
Thesis Credits
Plan A students take 10 thesis credits.
- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan C Coursework
Evaluation and Analysis (4 credits)
Take the following course:
- PDES 5701 - User-Centered Design Studio (4.0 cr)
Core Coursework (21 credits)
Take the following courses:
- DES 5185 - Human Factors in Design (3.0 cr)
- PDES 5702 - Visual Communication (3.0 cr)
- PDES 5703 - Prototyping Methods (4.0 cr)
- PDES 5704 - Computer-Aided Design Methods (3.0 cr)
- PDES 8721 - New Product Design and Business Development I (4.0 cr)
- PDES 8722 - New Product Design and Business Development II (4.0 cr)
Twin Cities Campus
Design Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Students select a minimum of 9 credits in consultation with their advisor and the director of graduate studies for the design graduate program.

Doctoral
Students select a minimum of 12 credits in consultation with their advisor and the director of graduate studies for the design graduate program.
Twin Cities Campus
Design Ph.D.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Design PhD program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify one of the following tracks:

- Apparel Studies (including dress, history, and culture; product development; and retail and consumer studies)
- Architecture
- Graphic Design
- Interior Design

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements vary by track. Requirements by track are available below, as well as on the design graduate program website: https://design.umn.edu/

For Architecture track: a professional M.Arch degree is required.

Other requirements to be completed before admission:
Apparel Studies Track: An undergraduate degree in the area of clothing textiles (e.g., retail merchandising; clothing design) is preferred.

Graphic Design track: an undergraduate or graduate degree in graphic design or a related field is preferred. Alternatively, applicants must have completed at least 12 semester credits of relevant design coursework or a minimum of 3 years of professional design experience.

Interior Design Track: an undergraduate or graduate degree in interior design or architecture is required; experience in interior design practice is preferred.

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language (TOEFL). The key to test abbreviations is GRE, TOEFL, IELTS, MELAB.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

**Research Ethics (1 credit)**

Take the following course:

- DES 8181 - Research Ethics (1.0 cr)

**Related Field or Minor Coursework (12 credits)**

Select 12 credits in consultation with the advisor.

**Thesis Credits**

Take 24 doctoral thesis credits. With the permission of the advisor, up to 10 credits may be taken prior to passing the preliminary oral examination.

- DES 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Apparel Studies**

The track in Apparel Studies advances both theoretical and practical knowledge of textile and apparel products related to human behavior. Here you will be provided with the opportunity to work with established scholars, participate in innovative research, and interact with a cohort of graduate students. As a graduate student in Apparel Studies, you can select from a wide range of supporting classes available from a multitude of programs at the University of Minnesota. You will also have access to social, cultural, and business resources abundant in the metropolitan setting of Minneapolis/St. Paul.

**Evaluation and Analysis Coursework (9 credits)**
Take the following courses for 6 credits:
- DES 8102 - Quantitative Research Methods (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Select 3 credits from the following in consultation with the advisor:
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

**CONCENTRATION**

**Dress, History, and Culture (18 credits)**

**Theory and Philosophy Coursework (6 credits)**
Take the following courses:
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)

**Dress, History, and Culture Coursework (12 credits)**
Select 12 credits from the following in consultation with the advisor:
- APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
- APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- APST 8266 - Behavioral Aspects of Dress (3.0 cr)
- DES 5165 - Design and Globalization (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- DES 8166 - Material Culture and Design (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)

**-OR-**

**Product Development (18 credits)**

**Theory and Philosophy Coursework (6 credits)**
Take the following courses:
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)

**Product Development Concentration Coursework (12 credits)**
Select 12 credits from the following in consultation with the advisor:
- APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
- APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
- APST 5224 - Functional Clothing Design (4.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- DES 5185 - Human Factors in Design (3.0 cr)
- DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8114 - Design Studio (4.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- DES 8166 - Material Culture and Design (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)

**-OR-**

**Retail and Consumer Studies (18 credits)**

**Theory and Philosophy Coursework (6 credits)**
Take the following course:
- APST 8272 - Digital Consumers: Theories in Retail and Consumer Studies (3.0 cr)

Select 3 credits from the following in consultation with the advisor:
- APST 8268 - Behavioral Aspects of Dress (3.0 cr)
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)

**Retail and Consumer Studies Concentration Coursework (12 credits)**
Select 12 credits from the following in consultation with the advisor:
- APST 5117 - Retail Environments and Human Behavior (3.0 cr)
- APST 5123 - Living in a Consumer Society (3.0 cr)
- APST 5193 - Directed Study in Apparel Studies (1.0 - 4.0 cr)
APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
APST 8193 - Directed Study (1.0 - 3.0 cr)
APST 8271 - Retailing: Strategic Perspectives (3.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8115 - Grant Writing (2.0 cr)
DES 8151 - Product Development: Theory and Practice (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)
DES 8167 - Aesthetics of Design (3.0 cr)

Architecture
The Architecture track provides a background in theory and research methods that responds to individual student interests. Building on previous knowledge, students may pursue study in a variety of areas including history/theory/culture, representation, design and design methods, technology, and professional practice, with the goal of adding to the knowledge base of the field. Students are prepared for research positions in professional practice and academia.

Theory and Philosophy Coursework (6 credits)
Take the following for 6 credits. Other courses can be selected with advisor approval.
DES 8112 - Design Theory (3.0 cr)
DES 8164 - Innovation Theory and Analysis (3.0 cr)

Evaluation and Analysis Coursework (9 credits)
Take the following courses for 6 credits:
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
Select 3 credits from the following in consultation with the advisor:
ARCH 5609 - Development and Implementation of Research (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)

Architecture Concentration Coursework (12 credits)
Take the following course:
ARCH 5451 - Architecture: Defining the Discipline (4.0 cr)
Select from the following in consultation with the advisor:
Take 8 or more credit(s) from the following:
• ARCH 5110 - Architecture as Catalyst (1.0 cr)
• ARCH 5301 - Conceptual Drawing (3.0 cr)
• ARCH 5313 - Visual Communication Techniques in Architecture (3.0 cr)
• ARCH 5321 - Architecture in Watercolor (3.0 cr)
• ARCH 5391 - Design and Representation with BIM (3.0 cr)
• ARCH 5392 - Facade Design & Construction (3.0 cr)
• ARCH 5410 - Topics in Architectural History (3.0 cr)
• ARCH 5411 - Principles of Design Theory (3.0 cr)
• ARCH 5412 - Architecture: A Global and Cultural History (3.0 cr)
• ARCH 5421 - Architecture and Interpretation: The Cave and the Light (3.0 cr)
• ARCH 5423 - Gothic Architecture (3.0 cr)
• ARCH 5424 - Renaissance Architecture (3.0 cr)
• ARCH 5425 - Baroque Architecture (3.0 cr)
• ARCH 5431 - Eighteenth-Century Architecture and the Enlightenment (3.0 cr)
• ARCH 5432 - Modern Architecture (3.0 cr)
• ARCH 5434 - Contemporary Architecture (3.0 cr)
• ARCH 5435 - History of American Architecture (3.0 cr)
• ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
• ARCH 5450 - Topics in Architectural Theory (1.0 - 3.0 cr)
• ARCH 5452 - Architecture: Design, Form, Order, and Meaning (4.0 cr)
• ARCH 5521 - Material Investigation: Concrete (4.0 cr)
• ARCH 5527 - Material Investigations: Stone and Water (4.0 cr)
• ARCH 5539 - Daylighting and Architecture Design (3.0 cr)
• ARCH 5550 - Topics in Technology (1.0 - 4.0 cr)
• ARCH 5561 - Tech 1, Structures for Building (3.0 cr)
• ARCH 5562 - Tech 2, Intro to Building Technology (3.0 cr)
• ARCH 5563 - Tech 3: Advanced Building Technology Integrated Building Systems (3.0 cr)
• ARCH 5564 - Tech 4: Building Structural Systems (3.0 cr)
• ARCH 5609 - Development and Implementation of Research (3.0 cr)
• ARCH 5611 - Design in the Digital Age (3.0 cr)
• ARCH 5630 - Practicum: Advanced Issues in Practice (3.0 cr)
• ARCH 5650 - Topics in Architectural Practice (1.0 - 4.0 cr)
Graphic Design
The Graphic Design Track focuses on design theory, process, and methods related to design practice and research. Potential areas of study include multicultural communication, visual representation of information, human interaction with designed objects, social and cultural implications of design, color systems and perception, design history, and design education. Students and faculty collaboratively develop designed objects and information resources that will enhance people's lives. The program integrates theory with practice in the application of emergent and established technologies to digital design solutions.

Completion of the UX MasterTrack Certificate, prior to admission, may apply towards the Graphic Design subplan/track requirements. Student will need to consult with the DGS for approval. Visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertracktm-certificate for more information.

Theory and Philosophy Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor:
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)

Evaluation and Analysis Coursework (9 credits)
Select in consultation with the advisor.
Take 6 or more credit(s) from the following:
- DES 8102 - Quantitative Research Methods (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- GDES 5388 - Graphic Design Research (3.0 cr)

Take 3 or more credit(s) from the following:
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Graphic Design Concentration Coursework (12 credits)
Take 6 or more credit(s) from the following:
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

Electives (6 credits)
Select from the following in consultation with the advisor.
Take 6 or more credit(s) from the following:
- DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• GDES 4131W - History of Graphic Design [WI] (4.0 cr)
• GDES 4345 - Advanced Typography (4.0 cr)
• GDES 5193 - Directed Study in Graphic Design (1.0 - 4.0 cr)
• GDES 5311 - Illustration (3.0 cr)
• GDES 5341 - Interaction Design (3.0 cr)
• GDES 5371 - Data & Information Visualization (3.0 cr)
• GDES 5383 - Digital Illustration and Animation (3.0 cr)
• GDES 5386 - Fundamentals of Game Design (3.0 cr)
• GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
• GDES 8193 - Directed Study (1.0 - 3.0 cr)

Interior Design
The Interior Design track emphasizes the theory, research, and specialized practice components of design as applied to peoples health, safety, and welfare in the interior environment, including culture, sustainability, and issues facing design education. Advances in theoretical knowledge and study of the interactions of humans in interior environments prepare students for teaching and research positions as well as design specializations within the profession.

Theory and Philosophy Coursework (6 credits)
Take the following course:
DES 8112 - Design Theory (3.0 cr)
Select 3 credits from the following in consultation with the advisor:
DES 8164 - Innovation Theory and Analysis (3.0 cr)
DES 8166 - Material Culture and Design (3.0 cr)

Evaluation and Analysis Coursework (9 credits)
Take the following courses for 6 credits:
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
Select 3 credits from the following in consultation with the advisor:
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Interior Design Concentration Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor:
DES 5165 - Design and Globalization (3.0 cr)
DES 5168 - Evidence-Based Design (3.0 cr)
DES 5185 - Human Factors in Design (3.0 cr)
DES 8113 - Teaching and Assessment (2.0 cr)
DES 8115 - Grant Writing (2.0 cr)
GDES 8361 - Color, Design, and Human Perception (3.0 cr)
IDES 8192 - Readings in Interior Design (1.0 - 3.0 cr)
IDES 8193 - Directed Study (1.0 - 3.0 cr)
Ecological Restoration in Landscape Architecture Minor

Twin Cities Campus

Landscape Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
Website: https://design.umn.edu/academics/explore-all-minors/ecological-restoration-graduate-minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 10
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Restoration, conservation, and ecological design projects have become an increasingly important component of the practice of landscape architecture and natural resource management. It is critical for students interested in the design and management of natural lands, water management landscapes, landscape reclamation, and other restoration project types to gain exposure to the issues associated with ecological restoration projects. This minor focuses on the applied practice of restoration with an emphasis on restoration management and design and the skills needed to lead successful projects.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Master's Minor Requirements
- ESPM 5071 - Ecological Restoration (4.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- LA 5576 - Ecological Restoration Project Planning and Management (3.0 cr)
Heritage studies and public history (HSPH) are the publicly engaged and community-accountable practices of historical scholarship, whether it is based in archival research, archaeology, material culture studies, architecture, preservation, or landscape studies. Although such a commitment to public interpretation, education, and preservation is part of all these disciplines, it is of tremendous benefit to heritage professionals to understand the connections and common issues in all of these perspectives, because the heritage field is increasingly characterized by such interdisciplinary integration.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The goal of this graduate program is to provide heritage and public history professionals this broader view, increasing their resource base and network of expertise. The program takes advantage of the deep scholarly expertise in these fields at the University of Minnesota, as well as the Minnesota Historical Societys extensive resources and expertise, to offer unparalleled training in the theory and methods of heritage and public history studies at the graduate level. The program will combine rigorous scholarly training with hands-on professional development, preparing graduates for positions in major public history and heritage institutions in Minnesota and elsewhere. The program will also train future generations of scholars and practitioners in the field to develop new, innovative, and entrepreneurial forms of historical interpretation in service of the public good.

Students are expected to acquire both general and specialized sets of perspectives and skills. Some required courses are designed to instill breadth and cohort connections; others are designed to build expertise in specific arenas of the heritage field, represented by the program tracks. Students will engage in experiential learning through embedded (credited) internships, and the design and execution of a community-engaged project.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Prospective applicants are encouraged to consult the degree programs section of the School of Architecture website for additional information: http://arch.design.umn.edu.

International applicants must submit score(s) from one of the following tests:
• TOEFL

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 31 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B option is available only to students pursuing the archaeological heritage track. The Plan B project is identified and planned in consultation with the adviser and the Archaeology Department at the Minnesota Historical Society.

Plan C: Plan C requires 31 major credits and 6 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: This course will operate as a workshop, drawing together a cohort of students, working individually or as part of a team, to craft independent heritage studies and public history research projects under the supervision of a faculty instructor. Projects may be based in archival research, public exhibitions, archaeology, material culture studies and preservation, architecture and preservation, or landscape studies. Consistent with the values of the program, projects shall have multidisciplinary perspectives, broadly consider aspects of diversity, and will be accountable to some stakeholder(s) identified by the students.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Core Coursework (13 credits)
All students must complete the following core courses. Take HSPH 8005 every fall and spring for 2 years for a total of 4 credits.

- HSPH 8001 - Who Owns the Past? Common Concerns and Big Questions in Heritage and Public History (3.0 cr)
- HSPH 8002 - Core Practices in Heritage Studies and Public History (3.0 cr)
- HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
- HSPH 8005 - Leadership and Future of Historical Organizations (1.0 cr)

Outside Coursework (6 credits)
All students must complete at least 6 credits outside the major, chosen in consultation with the adviser or director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Archaeological Heritage
This sub-plan is limited to students completing the program under Plan B or Plan C.

Archaeological Heritage Track (18 credits)
The archaeological heritage track offers both the Plan B and Plan C options. Students are expected to identify their chosen option, in consultation with the advisor or director of graduate studies, by end of their second year in the program.

Required Archaeological Heritage Track Coursework (6 credits)
Take the following courses for a total of 6 credits:

- HSPH 8004 - Capstone in Heritage Studies and Public History (3.0 cr)
- ANTH 5448 - Applied Heritage Management (3.0 cr)

Electives (6 credits)
Students must complete at least 6 additional elective credits, selected in consultation with the advisor or director of graduate studies.

Plan Options

Plan B Requirements
Take 6 credits of HSPH 8101. At least 3 of the 6 credits must be applied to the Plan B project, with the remaining 3 assigned in consultation with the advisor or director of graduate studies.

- HSPH 8101 - Internship (3.0 cr)

-OR-

Plan C Requirements
Take HSPH 8101 twice, to complete two separate internships, for a total of 6 credits.

- HSPH 8101 - Internship (3.0 cr)
Heritage Studies and Public History Minor
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
College of Architecture
School of Architecture
101 Rapson Hall
89 Church Street SE
Minneapolis, MN 55455-0811
Email: donofrio@umn.edu
Website: https://design.umn.edu/academics/programs/architecture/master-heritage-studies-public-history

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Heritage Studies and Public History (HSPH) are the publicly engaged and community-accountable practices of historical scholarship, whether based in archival research, archaeology, material culture studies, architecture, preservation, or landscape studies. Although such a commitment to public interpretation, education, and preservation is part of all these disciplines, it is of tremendous benefit to heritage professionals to understand the connections and common issues in all of these perspectives, because the heritage field is increasingly characterized by such interdisciplinary integration. The masters level minor is intended for students who are in programs preparing them for work in the heritage field, such as anthropology, art history, architecture/historic preservation, urban and regional planning, history, American studies, and other allied fields. The doctoral minor is intended for students who plan to work in heritage/public history positions outside of academia, or to be academic scholars whose work includes community-engaged research. The HSPH program and grad minor take advantage of the deep scholarly expertise in these fields at the University of Minnesota, as well as the Minnesota Historical Societys extensive resources and expertise, to offer unparalleled training in the theory and methods of heritage and public history studies at the graduate level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the HSPH director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Core Coursework (6 credits)
Take the following courses:
- HSPH 8001 - Who Owns the Past? Common Concerns and Big Questions in Heritage and Public History (3.0 cr)
- HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Select 3 additional HSPH-affiliated credits, in consultation with the HSPH director of graduate studies, to complete the 9-credit minimum. Coursework must be from a discipline other than the major field.

Doctoral
Select 6 additional HSPH-affiliated credits, in consultation with the HSPH director of graduate studies, to complete the 12-credit minimum. Coursework must be from a discipline other than the major field.
Twin Cities Campus

Human Factors and Ergonomics M.S.
DHA Human Factors and Ergonomics
College of Design

Link to a list of faculty for this program.

Contact Information:
Human Factors and Ergonomics Graduate Program, c/o DHA, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: HFEgrad@umn.edu
Website: https://design.umn.edu/academics/programs/about-human-factors-ergonomics

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HFE) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The graduate program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through the design of tools, systems, working environments, processes, and organizations. HFE has applications ranging from clothing and living spaces to business processes, the design of health care processes and technology, computer interfaces, and aircraft cockpits.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 96
  - Internet Based - Listening Score: 24
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 24
  - Internet Based - Speaking Score: 24

- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 30 major credits and 0 credits outside the major. There is no final exam.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Required Coursework (9 to 10 credits)**

**Required Seminar (1 credit)**
Take the following course:
- HUMF 8901 - Graduate Seminar in Human Factors and Ergonomics (1.0 cr)

**Research Methods Core (8 credits)**
Take the following courses. University credit for DES 5131 will be earned upon completion of the Coursera UX Design MasterTrack Certificate.
- DES 5131 - User Research for User Experience Design (3.0 cr)
- PSY 8814 - Analysis of Psychological Data (4.0 cr)
- PSY 8815 - Analysis of Psychological Data (4.0 cr)

**Research Ethics (0 to 1 credit)**
Take the course below, or select one of the online options identified at [http://humanfactors.design.umn.edu/research_ethics.html](http://humanfactors.design.umn.edu/research_ethics.html), in consultation with the advisor.
- DES 8181 - Research Ethics (1.0 cr)

**Component Coursework (9 credits)**
Select a course from each of the following three components, in consultation with the advisor, for a total of 9 credits.

**Human Factors Fundamentals (3 credits)**
Select a course the following:
- DES 5185 - Human Factors in Design (3.0 cr)
- HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
- HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
- HUMF 5874 - Human Centered Design to Improve Complex Systems (4.0 cr)

**Cognitive Human Factors (3 credits)**
Select a course the following:
- CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
- EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
- IDSC 8721 - Behavioral Decision Theory (3.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5031W - Perception [WI] (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)
- PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)

**Physical Human Factors (3 credits)**
Select a course the following:
- DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
- KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
- KIN 4136 - Embodied Cognition (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)
- KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 8135 - Human Kinematics (3.0 cr)

**Electives**
Select credits from the following, in consultation with the advisor, to complete the required course credits.

**User Interface Design**
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- DES 5132 - User Testing for User Experience Design (3.0 cr)
- NURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
- WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)

**Statistics**
If PSY 8960 is selected, take the Multivariate Statistics for Social Scientists section for 3 credits.

**PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)**

**PUBH 7406 - Biostatistical Inference II (3.0 cr)**

**STAT 5021 - Statistical Analysis (4.0 cr)**

### Designing Experiments

**STAT 5303 - Designing Experiments (4.0 cr)**

### Research Methods

**ANTH 4035 - Ethnographic Research Methods (3.0 cr)**

**KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)**

**PUBH 6341 - Epidemiologic Methods I (3.0 cr)**

**PUBH 6342 - Epidemiologic Methods II (3.0 cr)**

**PUBH 6343 - Epidemiologic Methods III (4.0 cr)**

### Human Factors

**CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)**

**CSCI 5125 - Collaborative and Social Computing (3.0 cr)**

**CSCI 5609 - Visualization (3.0 cr)**

**CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)**

**CSCI 8117 - Understanding the Social Web (3.0 cr)**

**DES 5130 - Visual Literacy (3.0 cr)**

**DES 5165 - Design and Globalization (3.0 cr)**

**DES 8151 - Product Development: Theory and Practice (3.0 cr)**

**GDES 8361 - Color, Design, and Human Perception (3.0 cr)**

**IDSC 8722 - Heuristic Decision Making (2.0 cr)**

**MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)**

**PSY 5501 - Self, Society and Health - What's Work Got To Do With It? (3.0 cr)**

**PSY 5708 - Organizational Psychology (3.0 cr)**

**PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)**

**PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)**

**PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)**

**PUBH 6806 - Principles of Public Health Research (2.0 cr)**

**SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)**

### Plans

**Plan A**

Take at least 10 master's thesis credits.

**HUMF 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)**

**-OR-**

**Plan C**

At least 6 credits of Plan C coursework must also satisfy the 50% Project-Based Coursework requirement. Select from the following in consultation with the advisor:

**CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)**

**CSCI 5609 - Visualization (3.0 cr)**

**CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)**

**DES 5185 - Human Factors in Design (3.0 cr)**

**HUMF 5874 - Human Centered Design to Improve Complex Systems (4.0 cr)**

**WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)**
Twin Cities Campus
Human Factors and Ergonomics Minor
DHA Human Factors and Ergonomics
College of Design

Link to a list of faculty for this program.

Contact Information:
Human Factors and Ergonomics Graduate Program, c/o DHA, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: HF.grad@umn.edu
Website: https://design.umn.edu/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HFE) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The graduate program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HFE has applications ranging from clothing and living spaces to business processes, the design of health care processes and technology, computer interfaces, and aircraft cockpits. The minor is available to master's and doctoral students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Any University of Minnesota graduate student in good standing is eligible to apply. Students discuss appropriate coursework with their advisers and the Director of Graduate Studies for Human Factors and Ergonomics. A GPA of 3.0 is required for good standing in the minor.

Master's students are required to take 9 credits to fulfill the minor.
Doctoral students are required to take 12 credits to fulfill the minor.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Students select a minimum of 9 credits in consultation with their advisor and the director of graduate studies for the human factors and ergonomics graduate program.

Doctoral
Students select a minimum of 12 credits in consultation with their advisor and the director of graduate studies for the human factors and
ergonomics graduate program.
Human Factors and Ergonomics Ph.D.
DHA Human Factors and Ergonomics
College of Design

Contact Information:
Human Factors and Ergonomics Graduate Program, c/o DHA, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108.
Email: HFEgrad@umn.edu
Website: https://design.umn.edu/academics/programs/about-human-factors-ergonomics

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 60
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HFE) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The graduate program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HFE has applications ranging from clothing and living spaces to business processes, the design of healthcare processes and technology, computer interfaces, and aircraft cockpits.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 96
  - Internet Based - Listening Score: 24
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 24
  - Internet Based - Speaking Score: 24
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Required Coursework**

**Required Seminar (1 credit)**
- Take the following course:
  - HUMF 8901 - Graduate Seminar in Human Factors and Ergonomics (1.0 cr)

**Research Methods Core (8 credits)**
- Take the following courses:
  - PSY 8814 - Analysis of Psychological Data (4.0 cr)
  - PSY 8815 - Analysis of Psychological Data (4.0 cr)

**Research Ethics (0-1 credits)**
- Take the course below, or select one of the online options identified at http://humanfactors.design.umn.edu/research_ethics.html, in consultation with the advisor.
  - DES 8181 - Research Ethics (1.0 cr)

**Additional Research Methods Course (3-4 credits)**
- Select a research methods course from the following in consultation with the advisor:
  - DES 5131 - User Research for User Experience Design (3.0 cr)

**Statistics**
- If PSY 8960 is selected, take the Multivariate Statistics for Social Scientists section for 3 credits.
  - PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
  - PUBH 7406 - Biostatistical Inference II (3.0 cr)
  - STAT 5021 - Statistical Analysis (4.0 cr)

**Designing Experiments**
- STAT 5303 - Designing Experiments (4.0 cr)

**Research Methods**
- ANTH 4035 - Ethnographic Research Methods (3.0 cr)
- KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)

**Component Courses (9 Credits)**
- Select a course from each of the following three components, in consultation with the advisor, for a total of 9 credits.

**Human Factors Fundamentals**
- Take at least 3 credits from the following:
  - DES 5185 - Human Factors in Design (3.0 cr)
  - HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
  - HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
  - HUMF 5874 - Human Centered Design to Improve Complex Systems (4.0 cr)

**Cognitive Human Factors**
- Take at least 3 credits from the following:
  - CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
  - EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
  - IDSC 8721 - Behavioral Decision Theory (3.0 cr)
  - PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
  - PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
  - PSY 5031W - Perception [WI] (3.0 cr)
  - PSY 5037 - Psychology of Hearing (3.0 cr)
  - PSY 5062 - Cognitive Neuropsychology (3.0 cr)
  - PSY 5064 - Brain and Emotion (3.0 cr)
  - PSY 8041 - Proseminar in Perception (3.0 cr)
  - PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
  - PSY 8201 - Social Cognition (3.0 cr)

**Physical Human Factors**
- Take at least 3 credits from the following:
  - DES 5188 - Anthropometrics, Sizing & Fit (4.0 cr)
  - KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
  - KIN 4136 - Embodied Cognition (3.0 cr)
  - KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
  - KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)
  - KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
  - KIN 8211 - Seminar: Perception and Action (3.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
RSC 8135 - Human Kinematics (3.0 cr)

Electives
Select from the following, in consultation with the advisor, to complete the 36 course credits required.

**User Interface Design**
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- DES 5132 - User Testing for User Experience Design (3.0 cr)
- NURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
- WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)

**Human Factors**
- CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
- CSCI 8117 - Understanding the Social Web (3.0 cr)
- DES 5130 - Visual Literacy (3.0 cr)
- DES 5165 - Design and Globalization (3.0 cr)
- DES 8151 - Product Development: Theory and Practice (3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- IDSC 8722 - Heuristic Decision Making (2.0 cr)
- MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
- PSY 5501 - Self, Society and Health - What's Work Got To Do With It? (3.0 cr)
- PSY 5708 - Organizational Psychology (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)

**Thesis Credits**
Take at least 24 doctoral thesis credits.
- HUMF 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Landscape Architecture M.L.A.
Landscape Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, 144 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-625-6860)
Email: ladesk@umn.edu
Website: https://design.umn.edu/academics/programs/landscape-architecture/master-landscape-architecture

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 57 to 89
- This program does not require summer semesters for timely completion.
- N/A
- Degree: Master of Landscape Architecture

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Landscape Architecture program at the University of Minnesota prepares students to approach complex issues facing urban, suburban, and rural environments and envision improvements at multiple scales across human and ecological systems. The programs urban location and close proximity to the Mississippi River and the Great Lakes allows students to explore the impacts of climate change, urbanization, social, and environmental injustice across a wide range of complex and challenging landscapes. These challenges include water scarcity and water quality and its impact on urban and agricultural regions, warming temperatures, reduced biodiversity, riverine flooding, as well as deeply institutionalized practices of discrimination and rapid urban development that continue to marginalize and burden communities of color. Students address these challenges directly by planning and designing interventions at systems and site scales to create more resilient landscape networks.

Our program curriculum is structured around design studios, supported by courses in construction technologies and materials, plant materials and ecology, media and representation (including geographic information systems), and research methods. The studio sequence begins with small local sites where intensive field investigations are critical to the design process. Second- and third-year option studios travel outside the state to investigate climate change causes and impacts such as water scarcity and sea-level rise, and other critical issues including remediation of polluted sites and restoration of ecological function. The program culminates in the capstone studio where students develop and research independent projects on the topic of their choosing.

The master of landscape architecture (MLA) is a three-year, 89-credit, first-professional degree required for students who wish to become licensed professional landscape architects. The program is accredited by the national Landscape Architecture Accreditation Board (LAAB). Applicants with accredited professional baccalaureate degrees in landscape architecture or architecture may be considered for advanced-standing.

Accreditation
This program is accredited by Landscape Architectural Accreditation Board (LAAB)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
MLA program applicants must have completed a baccalaureate degree.

Special Application Requirements:
Students are admitted for fall semester only. MLA program applicants must apply by January 15, for entry the following fall, to receive first consideration for admission, fellowships, and assistantships. In addition to the University's admission requirements, applicants must submit an electronic portfolio in 8.5 x 11 PDF format. GRE scores are not required; however, they can be helpful to applicants.
seeking national fellowships such as the Fulbright Scholarship. Please refer to the MLA website for detailed information regarding
department specific application requirements and procedures, including a downloadable checklist, at

International applicants must submit score(s) from one of the following tests:

• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
catalog website.

Program Requirements

Plan C: Plan C requires 51 to 83 major credits and 6 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: See department for more details.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Core Coursework

All MLA I and MLA II students must take the following courses for a total of 36 credits. LA 8206 must be taken twice.

LA 5131 - Geospatial Data Analysis and Design (3.0 cr)
LA 5202 - Landscape Analysis Workshop (1.0 cr)
LA 8206 - Making Urban Landscape Space (6.0 cr)
LA 8301 - Landscape Architecture: Research Issues and Methods (3.0 cr)
LA 8302 - Professional Practice (3.0 cr)
LA 8554 - Project Programming (2.0 cr)
LA 8555 - Advanced Landscape Planning and Design (6.0 cr)
LA 8773 - Landscape Infrastructure and Systems III (3.0 cr)
LA 8774 - Landscape Infrastructure and Systems IV (3.0 cr)

Outside Electives

All MLA I and MLA II students must take at least 6 of their elective credits outside of landscape architecture. Students may choose
any 5000-level or above course. Preferred electives include ARCH 5711, ARCH 5721, ARCH 5756, DES 5165, ESPM 5071, PA
5004, PA 5013, PA 5211, PA 5231.

MLA I and MLA II Program Options

The MLA I is a 3-year program. The MLA II is a 2-year program for students with an accredited undergraduate degree or who receive
advanced standing.

MLA I Requirements

Additional Course Requirements

MLA I students must take the following courses for 32 credits:

LA 5201 - Making Landscape Spaces and Types (6.0 cr)
LA 5203 - Ecological Dimensions of Space Making (6.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
LA 5376 - Representation I (4.0 cr)
LA 5377 - Representation II (4.0 cr)
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
LA 5772 - Landscape Infrastructure Systems II (3.0 cr)

Additional Required Coursework

MLA I students may participate in the Cities on the Water study abroad option, with the approval of their advisor and the director of
graduate studies. Students choosing the study abroad option take 6 credits of LA 8207, 3 credits of LA 5381, 3 credits of LA 5414.
and 3 credits of LA 5761 for a total of 15 credits. Students who do not choose the study abroad option take LA 8205 for 6 credits plus 9 credits of electives for a total of 15 credits.

**Cities on Water--Study Abroad Option**

MLA I students may participate in the Cities on the Water study abroad option, with the approval of their advisor and the director of graduate studies. Students choosing the study abroad option take 6 credits of LA 8207, 3 credits of LA 5381, 3 credits of LA 5414, and 3 credits of LA 5761 for a total of 15 credits.

- **LA 5381** - The City in Visual Culture (3.0 cr)
- **LA 5414** - Study Abroad: History and Culture (0.0 - 3.0 cr)
- **LA 5761** - Infrastructure + Culture (3.0 cr)
- **LA 8207** - Cities on Water International Workshop (6.0 cr)

**or Students Not Studying Abroad**

Students who do not choose the study abroad option take LA 8205 for 6 credits plus 9 credits of electives for a total of 15 credits.

- **LA 8205** - Urban Form Options: Landscape Architecture Studio (6.0 cr)

**MLA I Requirements**

**Cities on Water--Study Abroad Option**

MLA I students may participate in the Cities on the Water study abroad option, with the approval of their advisor and the director of graduate studies. Students choosing the study abroad option take 6 credits of LA 8207, 3 credits of LA 5381, 3 credits of LA 5414, and 3 credits of LA 5761 for a total of 15 credits.

- **LA 8207** - Cities on Water International Workshop (6.0 cr)
- **LA 5381** - The City in Visual Culture (3.0 cr)
- **LA 5414** - Study Abroad: History and Culture (0.0 - 3.0 cr)
- **LA 5761** - Infrastructure + Culture (3.0 cr)

**or Students Not Studying Abroad**

Those not choosing to study abroad take 6 credits of LA 8205, 4 credits of LA 5377, and 6 credits of electives for a total of 16 credits.

- **LA 8205** - Urban Form Options: Landscape Architecture Studio (6.0 cr)
- **LA 5377** - Representation II (4.0 cr)

**Electives for Students Not Studying Abroad**

MLA I students not choosing to study abroad take at least 9 elective credits that term along with 6 credits of LA 8205. Students may choose any 5000-level or above course. Preferred electives include ARCH 5711, ARCH 5721, ARCH 5756, DES 5165, ESPM 5071, PA 5004, PA 5013, PA 5211, PA 5231.

- **OR**

**MLA II Requirements**

**Cities on Water--Study Abroad Option**

MLA II students may participate in the Cities on the Water study abroad option, with adviser and director of graduate studies approval. Students choosing the study abroad option take 6 credits of LA 8207, 3 credits of LA 5381, 3 credits of LA 5414, and 3 credits of LA 5761 for a total of 15 credits.

- **LA 8207** - Cities on Water International Workshop (6.0 cr)
- **LA 5381** - The City in Visual Culture (3.0 cr)
- **LA 5414** - Study Abroad: History and Culture (0.0 - 3.0 cr)
- **LA 5761** - Infrastructure + Culture (3.0 cr)

**or Students Not Studying Abroad**

Those not choosing to study abroad take 6 credits of LA 8205, 4 credits of LA 5377, and 6 credits of electives for a total of 16 credits.

- **LA 8205** - Urban Form Options: Landscape Architecture Studio (6.0 cr)
- **LA 5377** - Representation II (4.0 cr)

**Electives for Students Not Studying Abroad**

MLA II students not choosing to study abroad take at least 9 elective credits that term along with 6 credits of LA 8205. Students may choose any 5000-level or above course. Preferred electives include ARCH 5711, ARCH 5721, ARCH 5756, DES 5165, ESPM 5071, PA 5004, PA 5013, PA 5211, PA 5231.

**Joint- or Dual-degree Coursework:** MLA/MS-Architecture Student may take a total of 24 credits in common among the academic programs.
Twin Cities Campus
Landscape Architecture M.S.
Landscape Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, 144 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Email: ladesk@umn.edu
Website: https://design.umn.edu/academics/programs/landscape-architecture/landscape-architecture-ms

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS is for students with a clear focus in research related to landscape architecture. MS students build expertise related to the practice of landscape architecture as they learn how to conduct research. Students specialize within areas of faculty expertise, which may include art and landscape architecture, landscape ecology, landscape architectural history and theory, park and recreation design, rural and suburban landscape planning, transportation, planning of world heritage sites, and urban design.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 6 major credits, 14 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.
Coursework Requirements

Landscape Architecture Electives
Take 6 or more credit(s) from the following:
• LA 5xxx
• LA 8xxx

Interest Area Electives
Choose elective credits, in consultation with the advisor, from coursework outside landscape architecture.
Take 6 or more credit(s) from the following:
• xxxx 5xxx
• xxxx 6xxx
• xxxx 7xxx
• xxxx 8xxx

Remaining Electives
Choose remaining credits in consultation with the advisor.
Take 8 or more credit(s) from the following:
• xxxx 5xxx
• xxxx 6xxx
• xxxx 7xxx
• xxxx 8xxx

Thesis credits
Take 10 master's thesis credits.
LA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Landscape Architecture Minor
Landscape Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, University of Minnesota, 144 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Email: ladesk@umn.edu
Website: https://design.umn.edu/academics/explore-all-minors/landscape-architecture-graduate-minor

Program Type: Graduate minor related to major
Requirements for this program are current for Fall 2022
Length of program in credits (Masters): 9
Length of program in credits (Doctorate): 12
This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in landscape architecture develop professional design skills through courses that address the increasingly complex relationships between art, ecology, and community that influence and inform design on the land. Courses emphasize three principal areas of study: 1) landscape architecture as a means to add to the aesthetic richness of our culture and environment—helping us to better understand ourselves and our place in the world; 2) integration of biological, geophysical, and ecological processes into lasting, meaningful, and systemically rigorous landscape architecture that sustains and protects the health of people and the ecosystems on which they depend; and 3) design for urban and suburban places and people, with emphasis on gaining knowledge and experience through direct engagement with clients and the public in order to address the problems and opportunities of the metropolitan core of cities.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor requirements are determined in consultation with the Landscape Architecture director of graduate studies.

Required Course
Take the following required course for 3 credits:
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Electives
Take at least 6 credits from the following:
LA 5003 - Climate Change Adaptation (3.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
LA 5755 - Infrastructure, Natural Systems and the Space of Inhabited Landscapes (3.0 cr)
LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
LA 8301 - Landscape Architecture: Research Issues and Methods (3.0 cr)

Doctoral Electives
Take at least 9 credits from the following:
LA 5003 - Climate Change Adaptation (3.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
LA 5755 - Infrastructure, Natural Systems and the Space of Inhabited Landscapes (3.0 cr)
LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
LA 8301 - Landscape Architecture: Research Issues and Methods (3.0 cr)
Twin Cities Campus
Lighting Design Minor
DHA Interior Design
College of Design

Link to a list of faculty for this program.

Contact Information:
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The lighting design minor provides an educational forum for students to engage regional lighting professionals, design practitioners, and industry representatives to study the evolving role of lighting design and technologies in professional practice. The coordination of lighting courses from interior design and architecture provides an integrated approach to electric lighting, interior design, and daylighting. The minor enables students to gain insight into the relationship between interior and architectural design strategies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required
Master’s students take these three courses:
ARCH 5539 - Daylighting and Architecture Design (3.0 cr)
IDES 5612 - Lighting Design (3.0 cr)
IDES 5617 - Lighting Design Innovations and Technological Advances (3.0 cr)

Doctoral
Required Courses
Doctoral students take these three courses:
ARCH 5539 - Daylighting and Architecture Design (3.0 cr)
IDES 5612 - Lighting Design (3.0 cr)
IDES 5617 - Lighting Design Innovations and Technological Advances (3.0 cr)

Electives
Take one course from the list below for 3 credits.
TH 5540 - Lighting Design for the Theatre (3.0 cr)
or TH 5545 - Stage Lighting Technology (3.0 cr)
or IDES 5193 - Directed Study in Interior Design (1.0 - 4.0 cr)
or IDES 5196 - Work experience (lighting internship) (3.0 cr)
Twin Cities Campus
Metropolitan Design Postbaccalaureate Certificate
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
College of Design, Metropolitan Design Program, 1 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (625-9000; fax: 626-0600)
Email: tlfisher@umn.edu
Website: https://design.umn.edu/academics/explore-all-certificates/metropolitan-design-graduate-certificate

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 21
- This program does not require summer semesters for timely completion.
- Degree: Metropolitan Design PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The metropolitan design certificate at the College of Design prepares students with the essential knowledge and understanding of the city within the complexities of the 21st-century metropolis. As suburban development is losing some of its past seductions, traditional cities are being transformed to accommodate the return to city living, an American counter-trend that requires the integrative approach of many fields of knowledge.

The certificate is open to graduate students in the College of Design and graduate students from other colleges with related urban planning programs are welcome to apply. The certificate is a two-semester, 21-credit course sequence within existing master's degrees at the College of Design. It is strongly recommended that the required urban design courses be taken in sequence.

Interested students should enroll during the second semester (spring) of graduate studies. It is recommended that students make a decision to enroll in the certificate early so that the completion of courses can be made within the time required for completion of the professional degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
An application is required including a 2-page statement of interest in the program, university transcripts, and a portfolio of design work (no more 10 pages). Other students not from the College of Design should submit comparable graphic examples and two written papers.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework

Required Courses (12 credits)
Take the following courses:
- ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
- ARCH 5721 - Case Studies in Urban Design (3.0 cr)
- ARCH 8255 - Graduate Architectural Design V (6.0 cr)

Electives (9 credits)
Select 9 credits from the following in consultation with the advisor:
- ARCH 5361 (Inactive) (3.0 cr)
- ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
- ARCH 5671 - Historic Preservation (3.0 cr)
- ARCH 5731 - Territorial City (3.0 cr)
- ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
- HSG 5463 - Housing Policy (3.0 cr)
- HSG 5467 - Housing and the Social Environment (4.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- LA 5405 - Interdisciplinary Studies in Landscape Architecture (1.0 - 6.0 cr)
- PA 5211 - Land Use Planning (3.0 cr)
- PA 5212 - Managing Urban Growth and Change (3.0 cr)
- PA 5231 - Transit Planning and Management (3.0 cr)
- PA 5261 - Housing Policy (3.0 cr)
- PA 5501 - Theories and Policies of Development (3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- PA 5721 - Energy Systems and Policy (3.0 cr)
- PA 5722 - Economics of Environmental Policy (3.0 cr)
- PA 5723 - Water Policy (3.0 cr)
Twin Cities Campus
Museum Studies Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Museum Studies Graduate Minor, College of Design, 240 McNeal Hall, 1985 Buford Avenue, 612-626-1219
Email: jmcelvai@umn.edu
Website: https://design.umn.edu/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: Museum Studies is not accepting students for the minor at this time.

The museum studies minor offers a structured graduate curriculum for master's and doctoral students interested in museums. It provides students from a variety of disciplines with an introduction to the issues involved in museum practices (e.g., educational, curatorial, administrative, and conservation). The curriculum includes seminars and internships.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
NOTE: Museum Studies is not accepting students for the minor at this time.

As a minor-only program, all graduate students who have already been accepted into a University of Minnesota Graduate program are eligible for acceptance into the program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Core Course Requirements
All students pursuing the museum studies minor must take the following core coursework, including 1 internship credit (MST 5020). Internships must be approved by the museum studies director of graduate studies.
- MST 5011 - Museum History and Philosophy (3.0 cr)
- MST 5012 - Museum Practices (3.0 cr)
- MST 5020 - Internship (1.0 - 6.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Complete the 7-credit core curriculum described above.
Doctoral Electives
In addition to the core curriculum, take at least 5 credits from the following courses:

**Communication**
- **JOUR 5251** - Strategic Communication Theory (3.0 cr)

**Leadership**
- **ACL 5221** - Creative Entrepreneurship and Resource Development (3.0 cr)
- **OLPD 5048** - Cross-Cultural Perspectives on Leadership (3.0 cr)
- **OLPD 8021** - Leadership: From Theory to Reflective Practice (3.0 cr)
- **PA 5101** - Management and Governance of Nonprofit Organizations (3.0 cr)
- **PA 5104** - Strategic Human Resource Management (3.0 cr)
- **PA 5123** - Philanthropy in America: History, Practice, and Trends (1.5 - 3.0 cr)
- **PA 5251** - Strategic Planning and Management (3.0 cr)

**Education**
- **PSY 5014** - Psychology of Human Learning and Memory (3.0 cr)

**Evaluation**
- **OLPD 5501** - Principles and Methods of Evaluation (3.0 cr)
- **PA 5311** - Program Evaluation (3.0 cr)

**Exhibition Design**
- **DES 5185** - Human Factors in Design (3.0 cr)
- **DES 8164** - Innovation Theory and Analysis (3.0 cr)
- **GDES 8361** - Color, Design, and Human Perception (3.0 cr)
- **KIN 5505** - Human-Centered Design - Principles and Applications (3.0 cr)

**Other Museum Studies Electives**
- Internships (MST 5020) must be approved by the museum studies director of graduate studies. Directed study (MST 8993) must be guided by a member of the museum studies graduate faculty.
- **MST 5020** - Internship (1.0 - 6.0 cr)
- **MST 8993** - Directed Study in Museum Studies (1.0 - 4.0 cr)
Twin Cities Campus
Product Design Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108
Email: dhagrad@umn.edu
Website: https://design.umn.edu/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 10
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Product design is the planning of an item intended to be manufactured and sold. These items exist both as discrete artifacts and as actors in larger social systems, such as branded environments, services, experiences, and social interactions. A graduate minor may be earned in product design when it logically relates to the graduate major field. The minor program is designed to suit the particular needs and interests of the student. The course of study is determined in consultation with the student’s major advisor and the director of graduate studies for the minor.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A graduate minor may be earned in product design when it logically relates to the graduate major field.

Other requirements to be completed before admission:
An application survey of interest must be completed to enroll in the minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students may petition for additional DES or GDES courses with approval of Product Design Graduate Program Director.

The course of study must be approved by the Product Design Director of Graduate Studies.

Product Design Core Courses
Required Course (4 Credits)
  PDES 5711 - Product Innovation Lab (4.0 cr)
Additional Courses (6 to 8 Credits)
Select courses from the list below in consultation with the advisor to satisfy minimum credit requirements.
  PDES 5701 - User-Centered Design Studio (4.0 cr)
  PDES 5702 - Visual Communication (3.0 cr)
  PDES 5703 - Prototyping Methods (4.0 cr)
  PDES 5704 - Computer-Aided Design Methods (3.0 cr)
  PDES 5705 - History and Future of Product Design (3.0 cr)
  DES 5185 - Human Factors in Design (3.0 cr)

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Information current as of November 07, 2022
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
**Twin Cities Campus**

**Additional Licensure Other**

*Curriculum & Instruction, Educational Psychology, Family Social Science, Kinesiology, School of, Organizational Leadership, Policy and Development*

**College of Education and Human Development**

Link to a [list of faculty](https://www.cehd.umn.edu/teaching/additional/) for this program.

**Contact Information:**

CEHD Office of Teacher Education  
275 Peik Hall  
159 Pillsbury Dr SE  
Minneapolis, MN 55455  
612-625-5060  
Email: ote@umn.edu  
Website: [https://www.cehd.umn.edu/teaching/additional/](https://www.cehd.umn.edu/teaching/additional/)

- **Program Type:** Post-baccalaureate credit certificate/licensure/endorsement  
- **Requirements for this program are current for Fall 2022**  
- **Length of program in credits:** 19 to 24  
- **This program requires summer semesters for timely completion.**  
- **Degree:** College of Education Additional Licensure

Along with the program-specific requirements listed below, please read the [General Information](https://www.cehd.umn.edu/teaching/additional/) section of the catalog website for requirements that apply to all major fields.

The additional licensure program offers a variety of courses specifically designed to address the competencies required by the state for various teaching and administrative licenses. Additional licenses are added to a current five-year, full-time professional Minnesota teaching license. Courses are offered throughout the year with evening courses offered during fall, spring, and summer semesters, and day courses offered during the summer semester. Students who enroll in the program are generally practicing teachers. They complete the program in an average of one to two years.

**Accreditation**

This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

**Program Delivery**

This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

Other requirements to be completed before admission:  
This program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

For an online application or for more information about graduate education admissions, see the [General Information](https://www.cehd.umn.edu/teaching/additional/) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

Students must complete all coursework with a grade of S or C or better.

**Required courses**

Required courses are specific to the individual Additional Licensure sub-plan programs listed.

**Program Sub-plans**

Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.

Director of Community Education
Director of Special Education
Early Childhood Special Education
Parent and Family Education
Principal K-12
Superintendent K-12
Twin Cities Campus

Additional Licensure Teaching
Curriculum & Instruction, Educational Psychology, Family Social Science, Kinesiology, School of, Organizational Leadership, Policy and Development

College of Education and Human Development

Contact Information:
CEHD Office of Teacher Education, 110 Wulling Hall, 86 Pillsbury Dr SE, Minneapolis, MN 55455 612-625-5060.
Email: ote@umn.edu
Website: http://www.cehd.umn.edu/graduate/additional-license.html

Program Type: Post-baccalaureate credit certificate/licensure/endorsement
Requirements for this program are current for Fall 2022
Length of program in credits: 19 to 24
This program requires summer semesters for timely completion.
Degree: College of Education Additional Licensure

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The additional licensure program offers a variety of courses specifically designed to address the competencies required by the state for various teaching and administrative licenses. Additional licenses are added to a current five-year, full-time professional Minnesota teaching license. Courses are offered throughout the year with evening courses offered during fall, spring, and summer semesters, and day courses offered during summer semester. Students who enroll in the program are generally practicing teachers. They complete the program in an average of one to two years.

Accreditation
This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
This program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students must complete all coursework with a grade of S or C or better.

Required courses
Required courses are specific to the individual Additional Licensure sub-plan programs listed.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.

**Academic and Behavioral Strategist**  
The professional development program in special education offers a program of study that leads to K-12 licensure as an Academic Behavioral Strategist (ABS) and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings with students who have mild to moderate disabilities. Graduates of the program are student-centered, collaborative professionals who implement evidence-based instructional interventions with fidelity to improve learner outcomes. The program incorporates maximizing learner expectations and learning opportunities including cultural and social diversity. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with developmental disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

**Agricultural Education 5-12**

**Autism Spectrum Disorders licensure**  
New student applications to Autism Spectrum Disorders are not being accepted.

**Chemistry Education 9-12**

**Comm Arts/Lit Educ 5-8/9-12**

**Comm Arts/Lit Education 5-8**

**Deaf and Hard of Hearing**  
The deaf education program within special education leads to an M.Ed. degree with potential for MN Licensure with additional coursework. It is designed to prepare reflective educators to work with students (and their families) with diverse linguistic and cultural backgrounds. Our program philosophy focuses on providing students with an in-depth understanding of advocacy, identity development, language and literacy development, and how to facilitate and assess development across ages and curricular areas giving equal value to ASL and English. The program will prepare graduates to have bilingual and bicultural competence along with the ability to demonstrate best practices and effective instructional strategies to meet the needs of individual learners; in addition, to engage in and value partnerships with deaf adults, parents, community and professional organizations.

**Developmental Disabilities**  
New student applications to Developmental Disabilities are not being accepted.

**Early Childhood Educ Birth-Gr3**

**Earth & Space Science Ed 9-12**

**Emotional and Behavioral Disorders**  
New student applications to Emotional and Behavioral Disorders are not being accepted.

**English as a Second Lang K-12**

**Learning Disabilities K-12**  
New student applications to Developmental Disabilities are not being accepted.

**Life Science Education 9-12**

**Mathematics Education 5-8**

**Mathematics Education 5-8/9-12**

**Oral/Aural**  
See Deaf and Hard of Hearing.

**Physics Education 9-12**
Reading

Visual Arts Education K-12

WorldLang/Cultures: Japanese K-12

WorldLang/Cultures: Arabic K-12

WorldLang/Cultures: Chinese K-12

WorldLang/Cultures: French K-12

WorldLang/Cultures: German K-12

WorldLang/Cultures: Hebrew K-12

WorldLang/Cultures: Italian K-12

WorldLang/Cultures: Latin K-12

WorldLang/Cultures: Norweg K-12

WorldLang/Cultures: Ojibwe K-12

WorldLang/Cultures: Polish K-12

WorldLang/Cultures: Russian K-12

WorldLang/Cultures: Spanish K-12

WorldLang/Cultures: Swedish K-12

Dance

Theatre
Twin Cities Campus
Adult Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in adult education (AdEd), is a specialized academic area of the Human Resource Development program in the Department of Organizational Leadership, Policy, and Development. AdEd graduate programs prepare individuals to work with adults in a variety of roles, such as program developers, teachers, advisers, administrators, and managers in a variety of formal and informal settings, such as educational institutions, business and industry, community agencies, healthcare organizations, continuing and professional education, and adult basic education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
When applying online, applicants should complete Statements #1 & 2 (Statement #1 should indicate if student is in a special cohort). Filling out statement #3 optional. Applicants must also submit a résumé and personal statement (limit two pages) describing career goals and rationale for interest in the M.Ed. program. Two letters of recommendation from individuals who can attest to the applicant's potential are also required. Admissions are done on a rolling basis with the following deadlines: March 1 (Summer), July 1 (Fall), November 1 (Spring).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 24 major credits and 10 credits outside the major. There is no final exam.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Required Courses**

Students must complete at least 34 credits, including the following courses:

- OLPD 5296: Field Experience in Adult Education
  
  (3 credits are required and no more than 6 credits may be applied toward the program)

- OLPD 5201 - Strategies for Teaching Adults (3.0 cr)

- OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)

- OLPD 5204 - Designing the Adult Education Program (3.0 cr)

- OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)

- OLPD 5607 - Organization Development (3.0 cr)

- OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)

- OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

One additional 3 credit Adult Education course with adviser approval

Up to 10 credits of electives courses with adviser approval to equal the 34 credits needed for this program. The appropriate elective courses may vary.

Note on OLPD 5296 Field Experience in Adult Education: 3 credits are required and no more than 6 credits may be applied toward the program.

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Rochester**

All sub-plans have the same curriculum requirements. New students are not being admitted to this sub-plan. Courses may be taken on the Twin Cities campus.
Twin Cities Campus
Adult Education Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organization Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 14
• This program does not require summer semesters for timely completion.
• Degree: Adult Education PBacc Certificate Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in adult education (AdEd), is a specialized academic area of the Human Resource Development program track in the Department of Organizational Leadership, Policy, and Development. AdEd graduate programs prepare individuals to work with adults in a variety of roles, such as program developers, teachers, advisors, administrators, and managers in a variety of formal and informal settings, such as educational institutions, business and industry, community agencies, healthcare organizations, continuing and professional education, and adult basic education.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students who possess a U.S. bachelor's degree (or international equivalent). Applications are reviewed on an ongoing basis and may be submitted at any time.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.
Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

**Required Coursework**
- OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
- OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
- OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)

Students should enroll for a minimum of 4 credits of OLPD 5296 or OLPD 5696
- OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)
- or OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)

**Electives**
- Only if needed to meet 14 credit minimum
- OLPD 5607 - Organization Development (3.0 cr)
- or Additional OLPD courses with adviser approval to make total credits earned equal at least 14 credits.
Twin Cities Campus
Adult Literacy Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
The Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 14
• This program does not require summer semesters for timely completion.
• Degree: Adult Literacy PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Adult Literacy Certificate is not taking applications at this time.

The Adult Literacy Certificate is designed to prepare teachers, administrators, trainers, and counselors in the broad political, social, economic, and theoretical aspects of adult literacy in a global environment.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
Other requirements to be completed before admission:
US bachelor's degree or international equivalent.

Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students. Students may pursue the certificate alone or concurrently with a UM master's or doctoral degree program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Adult Literacy
Select courses for a total of at least 6 credits. Additional courses should be selected in consultation with the faculty advisor and the director of graduate studies to meet the minimum credit requirements.

Module 1
OLPD 5211 - Introduction to the Undereducated Adult (1.0 cr)

Adult Education
Take one of the following courses for 3 credits.
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
or OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
Field Experience
Take the following course for 3 credits.
OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)

Electives
Take at least 2 credits of electives. Courses other than the following may be substituted with program advisor approval.
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
or CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
or CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
or CI 5662 - Second Language Curriculum Design (3.0 cr)
Twin Cities Campus
Advanced Practices in Second Language Teaching Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota's Advanced Practices in Second Language Teaching Certificate program is designed for teachers of foreign languages and English as a second/foreign language and is offered by the Department of Curriculum and Instruction in partnership with the Center for Advanced Research on Language Acquisition (CARLA) Summer Institute Program.

Courses are offered on the Twin Cities campus or online. The certificate may be completed independently or in conjunction with a Master of Education (MEd) degree in second language education at the University of Minnesota.

Although the University certificate does not lead to teaching licensure or state certification, it adds value to a pre-service or in-service teacher's academic program and professional life. Completion of the advanced practices in second language teaching certificate includes successful participation in a set of internationally recognized, high-quality summer institutes for language teaching as well as courses in the Second Language Education program and provides a vehicle for teachers to receive tangible recognition of preparation in advanced language teaching practices and methodologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one-page personal statement discussing your experience teaching languages and the ways this certificate program will contribute to your professional development. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of November 07, 2022

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The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (8 credits)
Select at least 1 course from each of the 3 focus areas, in consultation with the advisor, for a minimum total of 8 credits. Other courses can be chosen with advisor approval.

Technology and Language Teaching
Take 1 or more course(s) from the following:
- CI 5608 - CARLA Summer Institute Seminar (1.0 - 4.0 cr)
- CI 5668 - Transforming the Teaching of Language Online (TTLO) (3.0 cr)
- LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)
- LGTT 5111 - Using the Web for Communicative Language Learning (2.0 cr)

Cultural, Social, and Equity Issues in Language Teaching
Take 1 or more course(s) from the following:
- CI 5608 - CARLA Summer Institute Seminar (1.0 - 4.0 cr)
- CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
- CI 5629 - Teaching Language through the Lens of Social Justice (2.0 cr)
- CI 5638 - Critical Approaches to Heritage Language Education (2.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)

Innovations in Curriculum, Instruction & Assessment
Take 1 or more course(s) from the following:
- CI 5608 - CARLA Summer Institute Seminar (1.0 - 4.0 cr)
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (2.0 cr)
- CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
- CI 5625 - Assessing Language Learners’ Communication Skills via Authentic Communicative Performance Tasks (2.0 cr)
- CI 5627 - Creativity in the Second Language Classroom (2.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5658 - Language Testing and Assessment (3.0 cr)
- CI 5662 - Second Language Curriculum Design (3.0 cr)
- CI 5667 - Foreign Language Literacies: Using Target Language Texts to Improve Communication (2.0 cr)

Elective Courses
Select electives from Second Language Education program courses in consultation with the advisor to complete the 12-credit requirement.
Twin Cities Campus

Applied Child and Adolescent Development M.A.

Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development
51 East River Parkway
Minneapolis, MN 55455
612-625-9778
Email: icdapply@umn.edu
Website: http://icd.umn.edu/academics/applied-child-and-adolescent-development/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32 to 35
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students will gain knowledge of developmental processes and competence in the application of theory and research to practice and policy/research. Specialization happens via formal tracks in infant and early childhood mental health, child life, or individualized studies.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants identify their selected track at the time of application.

Applicants must have completed at least one general psychology, human development, or social science course with a grade of B or higher. Applicants must submit, via the online application system, a departmental application to a specific track, TOEFL scores if applicable, three letters of recommendation from persons familiar with their potential for graduate study, unofficial transcripts, a statement of career interests, goals, and objectives, and a statement of diversity.

Special Application Requirements:
Child Life track applicants (required):
*Completed, or have in progress, a child life introductory course
*Have completed at least 100 hours of paid or volunteer work in a pediatric health care setting, preferably under the supervision of a certified child specialist
*Meet the Child Life Councils minimum technical standards for clinical-setting internships

Child Life track applicants (recommended):
*Completed course in human anatomy or medical terminology
*Completed, or have in progress, a child life practicum experience

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 32 to 35 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Field Experience credits: The field experience, taken at the end of a student's course of study, integrates the foundational knowledge gained via coursework with an applied field experience/internship.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Core Courses (14 Credits)
Take the following courses:
- CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
- CPSY 5302 - Cognitive and Biological Development (3.0 cr)
- CPSY 5303 - Social and Emotional Development (3.0 cr)
- CPSY 5304 - Research Methods in Applied Child and Adolescent Development (3.0 cr)
- CPSY 5306 - Ethics and Professionalism in Applied Child and Adolescent Development (2.0 cr)

Field Experience Credits (3 to 6 credits)
Students pursuing the Individualized Studies track or the Infant and Early Childhood Mental Health Track take 3 credits. Students pursuing the Child Life track take 6 credits. Credits are completed in consultation with the advisor.
- CPSY 5996 - Field Experience in Applied Child and Adolescent Development (1.0 - 12.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Child Life
The child life track is committed to preparing child life specialists with a strong educational foundation in developmental science coupled with a thorough theoretical education in topics central to the child life profession, such as illness and injury, therapeutic play and relationships, and childhood death and bereavement. Students will develop the skills necessary to promote family-centered care and work with children and their families who are living with chronic and acute healthcare challenges.

Required Courses (15 credits)
Take the following courses:
- CPSY 5601 - Child Life Theory, Practice and Program Development (3.0 cr)
- CPSY 5602 - Developmental Perspectives on Illness and Injury in Healthcare (3.0 cr)
- CPSY 5603 - Therapeutic Play for Child Life Practice (3.0 cr)
- CPSY 5604 - Therapeutic Relationships: Supporting Children in Healthcare (3.0 cr)
- CPSY 5605 - Childhood Death and Bereavement (3.0 cr)

Individualized Studies
The individualized studies track prepares students whose work intersects with children and families with a strong academic foundation in developmental science and the opportunity to choose electives that best meet a students individual career goals. This track recognizes the wide-ranging professions that benefit from integration with developmental science, such as policy development, evaluation studies, prevention science, parent education, among many other domains currently addressed via existing coursework at the University.

Required Courses (3 credits)
Take the following course:
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)

Electives (12 credits)
Select at least 12 elective credits in consultation with the track advisor.
Infant and Early Childhood Mental Health
The Infant and Early Childhood Mental Health track is committed to the development of culturally competent, trauma-informed practitioners and policy makers through inter-disciplinary studies and supervised professional practice. The track's philosophy is shaped by an ecological, multigenerational, relational model of development and intervention, attending to the ways biology, environment (i.e., family, culture, socioeconomic context), and individual history transact to promote health and pathology. The track consists of coursework and training in the application of developmental science to early childhood evidence-based practice and policy development. The training prepares practitioners to conceptualize case work with young children (0-5) and their caregivers, and prepares individuals to formulate and advocate research-based policy and practice in the area of childrens mental health.

LPCC Licensure
The University does not award licensure; however, IECMH-track students who can attend on-campus classes have the opportunity to take 28 additional credits concurrently with their MA to complete LPCC licensure application requirements for the state of Minnesota. Most of the required coursework is offered through the University's Integrated Behavioral Health Program at the College of Continuing and Professional Studies.

Licensure requirements are subject to change. Please visit https://mn.gov/boards/behavioral-health/ for current requirements.

Required Courses (15 credits)
Take the following courses:
- CPSY 5503 - Development and Psychopathology in Early Childhood (3.0 cr)
- CPSY 5506 - Infant Observation Seminar I (1.0 cr)
- CPSY 5508 - Infant Observation Seminar II (1.0 cr)
- CPSY 5511 - Infant Observation Seminar III (1.0 cr)
- CPSY 5513 - Early Childhood Assessment (3.0 cr)
- CPSY 5518 - Prevention and Intervention in Early Childhood: Principles (3.0 cr)
- CPSY 5521 - Prevention and Intervention in Early Childhood: Practice (3.0 cr)
Twin Cities Campus
Autism Spectrum Disorder Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: sped-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/certificate/Autism.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Autism Spectrum Disorder Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program in autism spectrum disorder (ASD) is designed to prepare teachers and related service personnel to design and deliver services to children and youth with ASD and their families. This 12-credit program provides a broad overview of major issues in ASD and specialized training in methods of assessment, intervention, and treatment evaluation. This program offers professional development opportunities for autism resource specialists, public and private social service agency staff, personnel at public and private schools, treatment facility personnel, and other human service professionals.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
International students wishing to complete the certificate must be admitted to a degree program at the University of Minnesota, Twin Cities. Graduate applicants must have a minimum 2.80 GPA in an undergraduate degree and 3.00 in graduate coursework from accredited institutions.

Special Application Requirements:
All applicants must submit the following materials: - Two letters of recommendation on letterhead stationery from individuals who can address the applicant's abilities to work in a professional context with this population - Typed goal statement - Completed online application - Transcripts from all postsecondary institutions attended or currently attending, except the University of Minnesota. For students not currently in a University of Minnesota program, transcripts must be received from the issuing school in a sealed and stamped envelope.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

All coursework must be completed for the certificate. Students will have a maximum of four years to do so from the time of admission. Students must maintain a minimum 3.00 GPA in certificate coursework to remain in the program.

Required Coursework (12 credits)
Students must complete the following coursework.
EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder (3.0 cr)
Twin Cities Campus
Clinical Physiology and Movement Science Minor
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
400 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-624-4370; fax: 612-624-1314)
Email: jkonczak@umn.edu
Website: http://ccms.umn.edu/academic-programs/program-description

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's or doctoral minor in clinical physiology and movement science is an innovative free-standing graduate minor that is available to University of Minnesota graduate students. Offering a uniquely interdisciplinary program in a new, emerging field of study, the minor is designed for graduate students in clinical, engineering, nursing, public health, and medical fields who are interested in the clinical aspects of physiology and movement science. The interdisciplinary coursework combines physiology and movement science with clinical skills for research and the diagnosis and assessment of disease conditions. Developed by faculty with rich collective expertise from across the University, the minor offers students a choice of two tracks: clinical physiology or clinical movement science.

The minor is attractive to graduate students seeking a PhD or master's degree in kinesiology, rehabilitation sciences, and the speech and hearing sciences; in biomedical or mechanical engineering; in the School of Nursing; in the School of Public Health; or seeking a combined MD/PhD who have an interest in a variety of medical fields such as neurology, neurosurgery, otolaryngology, orthopedics, and pediatrics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students wishing to pursue this graduate minor must be currently enrolled in a graduate degree program at the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

CPMS 5101 Introduction to Clinical Physiology and Movement Science is a required core course for all students seeking the minor. KIN 5987 Professional Skills and Grant Writing for Health Sciences, 2 credits, is also required for a PhD minor, unless an equivalent course has been taken or the student can document previous grant writing experience.

Additional elective courses are selected in consultation with the faculty advisor and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the minor. Courses chosen will depend on the background and goals of the student. Students can select one of two tracks: clinical physiology or clinical movement science.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.
Clinical Movement Science (Master's)

**Required Courses**
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

**Electives**
Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed.
Take 4 or more credit(s) from the following:
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Exercise Testing and Prescription (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
- OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
- OTOL 8244 - Seminar: Current Literature (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Human Kinematics (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)

Clinical Movement Science (Doctoral)

**Required Courses**
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

**Electives**
Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed.
Take 7 or more credit(s) from the following:
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Exercise Testing and Prescription (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Human Kinematics (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
Clinical Physiology (Master's)

Required Courses
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

Electives
Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed. Take 6 or more credit(s) from the following:
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Exercise Testing and Prescription (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
- OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
- OTOL 8244 - Seminar: Current Literature (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Human Kinematics (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)

Clinical Physiology (Doctoral)

Required Courses
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

Electives
Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed. Take 9 or more credit(s) from the following:
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Exercise Testing and Prescription (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
- OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
- OTOL 8244 - Seminar: Current Literature (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Human Kinematics (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
• BMEN 5201 - Advanced Biomechanics (3.0 cr)
• CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
• CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
• KIN 5122 - Applied Exercise Physiology (3.0 cr)
• KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
• KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
• KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
• KIN 5485 - Exercise Testing and Prescription (3.0 cr)
• KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
• KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
• KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
• KIN 8132 - Seminar: Motor Development (3.0 cr)
• KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
• KIN 8211 - Seminar: Perception and Action (3.0 cr)
• NURS 5222 - Advanced Human Physiology (2.0 cr)
• NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
• NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
• SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
• NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
• OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
• OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
• OTOL 8244 - Seminar: Current Literature (1.0 cr)
• PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 7420 - Introduction to Clinical Trials (3.0 cr)
• RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
• RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
• RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
• RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
• RSC 8135 - Human Kinematics (3.0 cr)
• RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
• RSC 8282 - Problems in Human Movement (4.0 cr)
**Twin Cities Campus**  
Clinical Physiology and Movement Science Postbaccalaureate Certificate  
Kinesiology, School of  
College of Education and Human Development

Link to a list of faculty for this program.

**Contact Information:**  
400 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-624-4370; fax: 612-624-1314).  
Email: jkonczak@umn.edu  
Website: https://ccms.umn.edu/academic-programs

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement  
- Requirements for this program are current for Fall 2022  
- Length of program in credits: 12  
- This program does not require summer semesters for timely completion.  
- Degree: Clinical Physiology & Movement Science PBacc Cert

Along with the program-specific requirements listed below, please read the **General Information** section of the catalog website for requirements that apply to all major fields.

The clinical physiology and movement science postbaccalaureate certificate program is aimed at D.N.P. and M.D. fellows in nursing and medicine, as well as professionals in clinical fields, such as physical, occupational, and speech therapy. In addition, engineers working in the area of medical technology or medical device development are potential candidates. The interdisciplinary coursework combines physiology and movement science with clinical skills for research and the diagnosis and assessment of disease conditions. Students have the option to tailor the program to their individual needs and interest. They may select from a list of more than 30 courses. Developed by faculty with a rich collective expertise from across the University, the programs offer students a choice of two tracks: clinical physiology and clinical movement science.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.00.

Students wishing to pursue the certificate program must have completed a bachelor’s degree, preferably in an allied health sciences or natural science field.

**Special Application Requirements:**  
If the individual is applying for a certificate and is not currently enrolled in a graduate program at the University of Minnesota, two letters of support will be requested and a GPA of 3.0 or greater (or equivalent if there were a different student evaluation system) from a previous graduate program will be required. Submission package includes: clinical physiology and movement science application form, resume or curriculum vitae, transcripts, two letters of support, and documented language proficiency. Deadline for Fall semester admission is July 15; deadline for Spring semester admission is November 15.

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the **General Information** section of the catalog website.

**Program Requirements**  
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 3.0 is required for students to remain in good standing.

**Required Course**
This course is required for both the Clinical Movement Science track and the Clinical Physiology track:
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

**Elective Courses**
The following courses are offered by a number of graduate programs and can be used as course electives for the certificate program in consultation with the adviser. NURS 8173 and SAPH 8173 are cross-listed.
BMEN 5201 - Advanced Biomechanics (3.0 cr)
CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
KIN 5122 - Applied Exercise Physiology (3.0 cr)
KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
KIN 5395 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
KIN 5485 - Exercise Testing and Prescription (3.0 cr)
KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
KIN 8132 - Seminar: Motor Development (3.0 cr)
KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
NURS 5222 - Advanced Human Physiology (2.0 cr)
NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
OTOL 8244 - Seminar: Current Literature (1.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
RSC 8135 - Human Kinematics (3.0 cr)
RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
RSC 8282 - Problems in Human Movement (4.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Clinical Movement Science**
Clinical movement science is a new, interdisciplinary field of study focusing on human movement dysfunctions due to neurological or orthopedic diseases or diminished physical activity. This new field bridges the gap between basic and clinical sciences by crossing the boundaries of traditional disciplines of neurology, neurophysiology, kinesiology, and physical and occupational therapy. The curriculum includes a required core course that covers the theory and application of clinical physiology and movement science. Elective courses are chosen from a broad list of offerings in departments such as kinesiology, public health, rehabilitation science, and otolaryngology.

The postbaccalaureate certificate requires a minimum of 12 semester credits. CPMS 5101 serves as a required core course for all students seeking a certificate. Electives are selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the certificate. The specific courses chosen will depend on the background and goals of the individual student.

**Sample Program for Clinical Movement Science Track**

**Required**
Clinical Physiology
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Clinical physiology is a branch of physiology that bridges basic physiology and clinical medicine. It joins the gap between basic and clinical sciences by crossing the boundaries of traditional disciplines of neurology, neurophysiology, kinesiology, and physical and occupational therapy. The curriculum includes a required core course that covers the theory and application of clinical physiology and movement science. Elective courses are chosen from a broad list of offerings in departments such as kinesiology, public health, rehabilitation science, and otolaryngology.

The postbaccalaureate certificate requires a minimum of 12 semester credits. CPMS 5101 is required for all students seeking a certificate. Electives are selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS) in order to satisfy the requirements for the certificate. The specific courses chosen will depend on the background and goals of the individual student.

Sample Program for Clinical Physiology Track
Required
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

Electives
Students should register for 2 credits of OTOL 8239.
RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
Twin Cities Campus
Curriculum and Instruction M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 15 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (MEd)/professional studies degree programs are designed to meet the needs of practicing professionals in education and human development fields. Students admitted typically have interests in improving their current professional practice and applying their education to their present work responsibilities.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited college or university.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a clearly written statement of career interests, goals, and objectives. Master's applications are reviewed by department faculty three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. The final exam is optional.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

**Arts in Education**
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in arts in education is designed for experienced art, theater, and dance teachers, and others who want to acquire advanced knowledge and leadership skills in the arts field. The program is flexible and can be tailored to accommodate individual needs. Final project requirements include a school-based project examining a problem, issue, or topic identified by the student.

The MEd/professional studies arts in education sub-plan requires a minimum of 10 credits of core coursework, 14 credits of arts in education coursework, and 6 credits of electives for a total of 30 credits.

**Core Coursework (10 credits)**
- CI 5186 should be taken for 1 credit.
- CI 5049 - Digital Media & Technology Integration: Arts Education Theory & Practice (3.0 cr)
- CI 5116 - Action Research in Educational Settings (3.0 cr)
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)

**Arts in Education Requirements (14 credits)**
- CI 5050 should be taken for 3 credits.
- CI 5050 - Issues in Art Education (1.0 - 4.0 cr)
- CI 5069 - Curriculum Innovations in Arts Education (3.0 cr)
- CI 5075 - The Social, Historical and Cultural Foundations of Arts Education (3.0 cr)
- CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
- CI 8079 - Arts Based Research in Education (3.0 cr)

**Electives (6 credits)**
Courses will be selected in consultation with faculty advisor.

**Elementary Education**
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in elementary education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in elementary education is designed for elementary teachers who want to improve their instructional, decision-making, evaluation, and leadership skills. The program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies elementary education sub-plan requires 3 credits of core coursework, 15 credits of elementary education coursework, and 12 credits of electives for a total of 30 credits.

**Core Coursework (3 credits)**
- CI 5111 - Introduction to Elementary School Teaching (3.0 cr)

**Elementary Education Requirements (15 credits)**
Courses will be selected in consultation with faculty advisor.

**Electives (12 credits)**
Courses will be selected in consultation with faculty advisor.

**English Education**
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in English education addresses the needs and interests of middle school, high school, and community-college English teachers. The English education program provides instruction on current developments in English/language arts curriculum theory and research, as well as methods for teaching literature, reading, composition, media, drama, and journalism. The program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies English education sub-plan requires 6 credits of core coursework, 18 credits of English education coursework, and 6 credits of electives for a total of 30 credits.

**Core Coursework (6 credits)**
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

**English Education Requirements (18 credits)**
Take 18 or more credits from the following:
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5442 - Adolescent Literature, Youth Activism and Climate Change Literacy (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)

**Electives (6 credits)**
Courses will be selected in consultation with faculty advisor.

Environmental Education
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in environmental education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies degree program in environmental education is designed to develop leaders in environmental education through integrated research, outreach, and teaching. This program of at least 30 semester credits offers an interdisciplinary, integrated approach to environmental learning and leadership for school teachers, extension service educators, and environmental educators in formal and informal settings. Learning experiences allow students to integrate their work experience and academic study. Field work, evaluation methods, internships, and other practical applications of theory and method are integral parts of the program.

The MEd/professional studies environmental education sub-plan requires 13 credits of core coursework, 3 credits of coursework related to research methods/evaluation/statistics, and 14 credits of electives for a total of 30 credits.

**Core Coursework (13 credits)**
- CI 5186 and CI 5190 must each be taken for a minimum of 2 credits. Additional courses should be selected in consultation with the faculty advisor and the director of graduate studies to meet the minimum credit requirements.
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)
- CI 5190 - Directed Individual Study in Curriculum and Instruction (1.0 - 6.0 cr)

**Research Methods, Evaluation, or Statistics (3 credits)**
A minimum of 3 credits, chosen in consultation with the faculty advisor, intended to provide skills or knowledge essential to the required research project.

**Electives (14 credits)**
A minimum of 14 credits of graduate-level coursework (5xxx and above) selected in consultation with faculty advisor from the following fields: natural sciences, social sciences, humanities, education, natural resources, or agriculture.

Interdisciplinary Studies
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in interdisciplinary studies is a graduate-level, practitioner-based, coursework-only program designed for cohorts of experienced K-12 teachers of different subjects. This program is for cohorts of students and is not offered to individuals.

It integrates coursework representing a number of academic disciplines as defined in K-12 contexts with coursework emphasizing
particular areas of interest. Practicing teachers complete 30 semester credits of work in two areas: a core academic program with courses representing a range of K-12 disciplines, and elective courses related to a specific focus area. The program may be combined with a certificate program offered in the Department of Curriculum and Instruction. Depending upon the cohort for which the program is designed, the program may be completed entirely online, entirely face-to-face (F2F), or as a hybrid, with a combination of F2F and online coursework.

The MEd/professional studies interdisciplinary studies sub-plan requires a minimum of 15 credits of interdisciplinary studies coursework, and 15 credits of electives for a total of 30 credits.

**MEd - Interdisciplinary Studies**

**Interdisciplinary Studies**

**Total: 30 credits**

**Interdisciplinary Requirements (15 credits)**

Students will take CI 5150 twice: once under the “Educational Inequities: Race, Class & Gender” topic, and the second under the “Teaching for Civic Engagement” topic. Each course should be taken for 3 credits.

Take 5 or more course(s) totaling 15 or more credit(s) from the following:
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 4.0 cr)
- CI 5150 - Curriculum Topics (1.0 - 4.0 cr)
- CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)

**Electives (15 credits)**

Elective credits around a specific focus area will be identified for specific cohorts based on their expressed interests. Elective credits may be comprised of courses leading to a particular certificate.

-OR-

**Interdisciplinary Studies - Dual Language & Immersion Education Cohort**

**Total: 30 credits**

**Interdisciplinary Requirements (15 credits)**

Students will take CI 5150 twice: once under the “Educational Inequities: Race, Class & Gender” topic, and the second under the “Teaching for Civic Engagement” topic. Each course should be taken for 3 credits.

Take 5 or more course(s) totaling 15 or more credit(s) from the following:
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 4.0 cr)
- CI 5150 - Curriculum Topics (1.0 - 4.0 cr)
- CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)

**Cohort Requirements (15 credits)**

Students will take the topic “Biliteracy Development in Dual Language and Immersion Classrooms” for the CI 5660 requirement. CI 5660 is taken for 3 credits.

- CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
- CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)

**Language Immersion Education**

This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in language immersion education is designed for practicing language immersion, dual language, or bilingual educators, or individuals with an interest in language immersion and dual language education. Program participants have the option to add a 15-credit certificate in dual language and immersion education, which requires a separate application. Offered partially online, the program provides educators with the specific knowledge base and pedagogical skill set needed for the dual language and immersion (DLI) education setting and emphasizes practical application of concepts. Key topics include: second language acquisition; research foundations of DLI education; curriculum planning and assessment development that integrates subject-matter content, language, literacy and culture; biliteracy development; language-focused instructional practices and strategies to bring a language focus to content-based instruction; academic language development; issues related to language status; culturally relevant pedagogy; and tools for assessing language proficiency development.

The MEd/professional studies language immersion education sub-plan requires 17-18 credits of language immersion education coursework, and 12-13 credits of electives for a total of 30 credits.

**Language Immersion Requirements (17-18 credits)**

- CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)

Students will take one of the following technology courses, or an alternate 3-credit substitute approved by the advisor.

CI 5351 - Technology Tools for Educators (3.0 cr)
or LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)

Electives (12-13 credits)
Electives will be selected in consultation with faculty advisor, but may include the following options:
Take 12 - 13 credit(s) from the following:
• CI 5116 - Action Research in Educational Settings (3.0 cr)
• CI 5186 - School-Related Projects (1.0 - 4.0 cr)
• CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
• CI 5646 - English Grammar for ESL Teachers (3.0 cr)

Learning Technologies
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in learning technologies is designed for professionals interested in using technology in their organizations (especially K-12 and college educators, new media designers, and corporate trainers). This program also serves students interested in using technology to develop instructional materials for a wide range of settings. Because TEL certificate requirements are incorporated into the MEd program, students may earn a certificate while earning the MEd degree.

The MEd/professional studies learning technologies sub-plan requires 9 credits of core coursework, 12 credits of learning technologies coursework, and 9 credits of electives for a total of 30 credits.

Core Coursework (9 credits)
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 5116 - Action Research in Educational Settings (3.0 cr)
CI 5392 - Learning Technologies M.Ed. Capstone Project (3.0 cr)

Learning Technologies Requirements (12 credits)
Courses will be selected in consultation with faculty advisor.

Electives (9 credits)
Courses will be selected in consultation with faculty advisor.

Mathematics Education
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in mathematics education is designed for experienced mathematics teachers who want to acquire advanced knowledge and leadership skills in the field of mathematics education. The program is flexible and can be tailored to accommodate individual needs. Final project requirements include a school-based project examining a problem, issue, or topic identified by the student.

The MEd/professional studies mathematics education sub-plan requires 6 credits of core coursework, 14 credits of mathematics education coursework, and 10 credits of electives for a total of 30 credits.

Core Coursework (6 credits)
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5116 - Action Research in Educational Settings (3.0 cr)

Mathematics Education Requirements (14 credits)
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
MTHE 5993 - Directed Studies in Mathematics Education (2.0 cr)

Mathematics Education Electives
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
• MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
• MTHE 5171 - Teaching Problem Solving (3.0 cr)
• MTHE 5172 - Teaching Probability and Statistics (3.0 cr)

Electives (10 credits)
Courses will be selected in consultation with faculty advisor. Students choose electives from MATH-designated courses (minimum 7 credits); one MTHE-designated course may be included (maximum 3 credits).
Science Education
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in science education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in science education is designed for experienced science teachers who want to acquire advanced knowledge and leadership skills in the field of science education. The program is flexible and can be tailored to accommodate individual needs. Final project requirements include a school-based project examining a problem, issue, or topic identified by the student.

The MEd/professional studies science education sub-plan requires 9 credits of core coursework, 12 credits of science education coursework, and 9 credits of electives for a total of 30 credits.

Core Coursework (9 credits)
CI 5186 should be taken for 3 credits.
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)

Science Education Requirements (12 credits)
Additional courses should be selected in consultation with the faculty advisor and the director of graduate studies to meet the minimum credit requirements.
CI 5533 - Current Developments in Science Teaching (3.0 cr)
CI 5535 - Foundations of Science Education (3.0 cr)
CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)

Electives (9 credits)
Courses will be selected in consultation with faculty advisor.

Social Studies
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in social studies education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in social studies education is designed for experienced social studies teachers who want to acquire advanced knowledge and leadership skills in the field of social studies education. This program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies social studies education sub-plan requires 3 credits of core coursework, 15 credits of social studies education coursework, and 12 credits of electives for a total of 30 credits.

Core Coursework (3 credits)
CI 5741 - Introduction to Social Studies Education (3.0 cr)

Social Studies Requirements (15 credits)
Courses will be selected in consultation with faculty advisor.

Electives (12 credits)
Courses will be selected in consultation with faculty advisor.

Second Language Education
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in second language education (SLE) is designed for second language teachers who want to acquire advanced knowledge of research, best practices, and effective policies in the field of language education. The program addresses the needs and interests of second language educators in a variety of teaching contexts, including world, heritage, and indigenous languages as well as English as a second/foreign language (ESL/EFL). While the program emphasizes instructional issues related to K-12 education, it is also relevant to teachers working with university-level or adult learners. The program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies second language education sub-plan requires 20-21 credits of coursework in the Second Language Education Program and technology focus area, and 9-10 credits of electives for a total of 30 credits.

SLE Requirements (18 credits)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5658 - Language Testing and Assessment (3.0 cr)
CI 5662 - Second Language Curriculum Design (3.0 cr)

Technology focus (2-3 credits)
Students will take one of the following technology courses, or an alternate 3-credit substitute approved by the faculty advisor.
CI 5351 - Technology Tools for Educators (3.0 cr)
or LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)

ESL/EFL Focus Area Required Courses (7-10 credits)
Students with an ESL/EFL focus area must take one grammar course as well as the practicum: CI 5654 in which 4-6 credits is preferred. Other courses must be discussed with the faculty adviser.
CI 5654 - Practicum in Language Teaching: ESL and World Languages (1.0 - 6.0 cr)

Grammar course option
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
or CI 5649 - Language Analysis for ESL Teaching in Higher Ed (3.0 cr)

Electives (0-10 credits)
Non-ESL/EFL focus area students will select electives in consultation with faculty advisor to round out their 30 credits total for the degree. Depending on the course choices of ESL/EFL focus area students, they may not need to take any electives to fulfill requirements for their 30 credit degree.

Second Language Pedagogy
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in second language pedagogy is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in second language pedagogy is designed for practicing K-16 world language or English as a second language (ESL) teachers with an interest in enhancing their pedagogical knowledge and skills. Program participants have the option to add a 12 credit certificate in advanced practices in second language teaching, which requires a separate application. This coursework-only program is offered in conjunction with the summer institute program offered through the University’s Center for Advanced Research on Language Acquisition (CARLA).

Key topics include second language acquisition; the foundations of second language pedagogy and education; using technology to enhance language instruction; content-based curriculum development; performance assessment and issues in language testing; strategies to enhance second language literacy development and the teaching of speaking and listening skills; and integrating culture in language teaching.

The MEd/professional studies second language pedagogy sub-plan requires 21 credits of second language pedagogy coursework, and 9 credits of electives for a total of 30 credits.

Second Language Pedagogy Requirements (21 credits)
LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)
CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
CI 5622 - Exploring Learner Language: Puzzles and Tools for the Classroom (2.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5662 - Second Language Curriculum Design (3.0 cr)
CI 5642 - Assessing English Learners (3.0 cr)
or CI 5658 - Language Testing and Assessment (3.0 cr)

Electives (9 credits)
Take 9 or more credit(s) from the following:
• CI 5608 - CARLA Summer Institute Seminar (1.0 - 4.0 cr)
• CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
• CI 5625 - Assessing Language Learners’ Communication Skills via Authentic Communicative Performance Tasks (2.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
Twin Cities Campus

Developmental Psychology Minor

Institute of Child Development

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Website: https://icd.umn.edu/academics/developmental-psychology-graduate/doctoral-minor/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate students pursuing a doctoral degree in other fields may complete a doctoral minor in developmental psychology. Contact the Institute of Child Development for more information.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Please contact the associate director of Curriculum and Student Services at the Institute of Child Development before declaring the developmental psychology minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Developmental Psychology Core
CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

Remaining electives
Select additional credits in consultation with the developmental psychology director of graduate studies.
Take 1 - 2 course(s) totaling 4 or more credit(s) from the following:
*CPSY 8xxx

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

DOCTORAL
Twin Cities Campus
Developmental Psychology PhD
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Website: https://icd.umn.edu/academics/developmental-psychology-graduate/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 68 to 97
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD in developmental psychology focuses primarily on training for research in normal human development. The goal of the program is to train all students for careers in research and college teaching in developmental psychology, and to prepare students in the developmental psychopathology and clinical science program options for careers in applied areas of child psychology as well.

Students are admitted to either the developmental science track or the developmental psychopathology and clinical science track. Developmental science track students may choose to specialize in an area such as cognitive neuroscience, language, learning, personality, memory, perception, psychobiology, or social development.

Students interested in clinical research may specialize in developmental psychopathology and clinical science through participation in the developmental psychopathology and clinical science (DPCS) training program. DPCS training is a cooperative effort between the Institute of Child Development and the Department of Psychology to instruct leaders in research and teaching. DPCS training draws on the unique strengths of each program. Students in this track complete a required clinical internship, which adds an additional year to program completion.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Most students admitted have a substantial academic background in psychology and undergraduate research experience.

Graduate education is not a pre-requisite for admission to the PhD program. Students may apply after earning their bachelor's degree, provided they have sufficient research experience.

Special Application Requirements:
For full application instructions, please see: https://icd.umn.edu/academics/developmental-psychology-graduate/apply/ Applications are accepted for fall semester entry only and due by December 1 of the previous year. Late applications are not accepted.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
44 to 48 credits are required in the major.
0 to 25 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Core Courses
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8304 - Developmental Research Methods (3.0 cr)
- CPSY 8307 - Prelim Seminar (1.0 cr)
- CPSY 8321 - Seminar in Teaching Developmental Psychology (1.0 cr)
- CPSY 8322 - Apprenticeship in Teaching Developmental Psychology (1.0 - 3.0 cr)

Statistical Analysis Sequence
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Research Credits
- Take 14 or more credit(s) from the following:
  - CPSY 8994 - Research Problems in Child Psychology (1.0 - 6.0 cr)

Thesis Credits
- Students are eligible to take research credits once they have successfully defended their dissertation prospectus.
- Take exactly 24 credit(s) from the following:
  - CPSY 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
- Students are required to complete one of the following sub-plans.
- Students may not complete the program with more than one sub-plan.

Developmental Science Track
- Our program is designed to prepare tomorrow's leaders in the field of developmental science. Study human development across the lifespan and prepare for a career in academics or research.
- Choose to conduct research in areas including cognitive development, language, learning, executive function, social development, or developmental psychobiology and neuroscience. You also can choose to combine your interests and work alongside multiple ICD faculty members to define a research area that's unique to you.
- Students will take an additional five credit hours of developmental psychology special topics and advanced seminar courses, along with an additional five credit hours of developmental psychology or outside elective courses, to fulfill degree requirements.

Special Topics and Advanced Seminars
- 5 credits of CPSY 8360/CPSY 86xx, of which one course must be at least 3 credits.
- Take 2 or more course(s) totaling 5 or more credit(s) from the following:
  - CPSY 8360 - Special Topics in Developmental Psychology (1.0 - 3.0 cr)
  - CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
  - CPSY 8607 - Developmental Neurobiology of Stress and Emotion (3.0 cr)
  - CPSY 8608 - Clinical Interventions Across the Lifespan (3.0 cr)

Elective Credits
- 5 credits of CPSY or outside elective coursework, planned in consultation with adviser.
- CPSY 8xxx
- or Graduate-level courses (5000-8000 level) to be chosen in consultation with your faculty advisor.
Developmental Psychopathology and Clinical Science

We offer a joint track in collaboration with the Department of Psychology focused on the study of psychopathology in the context of development. To prepare you to become a leader in the science and profession of clinical child psychology, you'll take developmental psychology courses with your cohort at the Institute of Child Development, as well as clinical-based courses in the Department of Psychology.

As a student in the clinical science track, you'll complete coursework in clinical psychology, practicums, and a year-long internship. You'll also receive APA-accredited clinical training through the psychology doctoral program.

The joint track takes six years to complete, including the internship.

DPCS students must take an additional 31 course credits, in addition to successfully completing an internship, to graduate.

DPSC Courses

PSY 8960 should be taken once for one credit. PSY 8620 must be taken 4 times with a minimum of 4 credits, it is recommended that it be taken for four semesters, one credit each semester.

CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
CPSY 8608 - Clinical Interventions Across the Lifespan (3.0 cr)
PSY 8602 - Psychopathology & Personality (3.0 cr)
PSY 8603 - Clinical Seminar Series: Contemporary Directions In Clinical Psychology Research (1.0 cr)
PSY 8614 - Intellectual and Neuropsychological Assessment (3.0 cr)
PSY 8615 - Professional Methods in Applied Assessment I: Intellectual & Neuropsychological Functioning (3.0 cr)
PSY 8616 - Applied Assessment II, Personality and Psychopathology (3.0 cr)
PSY 8617 - Ethical and Equitable Decisions in Clinical Science and Counseling Psychology (3.0 cr)
PSY 8619 - Foundations in Therapeutic Intervention Applying Theory to Clinical Practice (3.0 cr)
PSY 8620 - Clinical Practicum: Consultation, Supervision, Professional Standards, and Lifelong Learning (1.0 - 6.0 cr)
PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
Twin Cities Campus
Disability Policy and Services Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Disability Policy and Services PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in disability policy and services is designed to allow graduate as well as community professionals, to study policies and services that affect the lives of children, youth, and adults with disabilities. The 12-credit program surveys the spectrum of education, health, and social services available to individuals with disabilities and their families, and examines the public and private networks of disability services from an interdisciplinary perspective. While the program addresses the needs of people with all types of disabilities, it emphasizes developmental disabilities across the lifespan. The program's individualized learning experience (ILE) requires students to integrate theory with practice by completing a disability-related research project or working directly with people with disabilities in settings such as schools, recreation centers, or human-service agencies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

Other requirements to be completed before admission:
Applicants must have completed an undergraduate degree by the time they start the program. Students must have completed a four-year college degree or equivalent coursework. Applications are reviewed on a rolling basis and may be submitted at any time.

Special Application Requirements:
Please address the following five questions below. Please answer each question listed and limit your response to 2 typed or word-processed pages, size-12 font. Upload your responses to the ApplyYourself online application in the "Program Specific Questions" upload area.

- What are you major areas of interest in the field of disability services or related to individuals with disabilities?
- What have been your past experiences in the area of disability services or related to individuals with disabilities?
- What is your current involvement in the field of disability services or related to individuals with disabilities?
- What is your anticipated or desired career interest?
- Why are you interested in the Disability Policy and Services Certificate Program?

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
In addition to coursework, students must participate in at least six, one-hour interdisciplinary reflection groups to discuss relevant topics and ways to integrate field experiences with coursework. Reflection groups are offered throughout the year, including the summer session.

**Required Course**
OLPD 5356 - Disability Policy and Services (3.0 cr)

**Specialized Coursework**
This component broadens the student's level of knowledge in disability policies and services. Students must choose from courses offered across the University focusing on disability policy, disability services, and/or interdisciplinary teaming, such as communication disorders, family social science, kinesiology, nursing, public affairs, or social work. The ICI Certificate Coordinator can provide students with a list of acceptable courses meeting this requirement.
6 cr to be taken with approval from the ICI Certificate Coordinator

**Individualized learning experience & Interdisciplinary reflection groups**
This component allows students to integrate and apply the information they have learned in coursework. Students work with the ICI Certf Coord to design an individualized learning experience (ILE) in which they work with persons who have disabilities in settings like schools, recreation centers, health clinics, or human-service agencies. The ILE can be completed in one or two semesters, but must total at least 3 cr and at least 200 hours. The 3 cr to be taken with approval from the ICI Certf Coord
Twin Cities Campus

Dual Language and Immersion Education Postbaccalaureate Certificate

Curriculum & Instruction

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: Clinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Dual Language Immersion Education PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This graduate-level certificate program gives students an opportunity to complete a coordinated series of courses in the area of dual language and immersion education. The program does not lead to a state teaching certificate or licensure (note that a university certificate program or certificate is distinct from a state certificate or certification).

In Minnesota and other states in the US, dual language/immersion teachers at the elementary level are required to hold a teaching license in elementary education, and at the secondary level a license in the subject matter they teach (e.g., science, social studies, math). The University of Minnesota offers an initial teacher licensure program in elementary education with a focus on dual language and immersion education.

The dual language and immersion education certificate program is designed for preK-12 teachers and other professionals to be able to work effectively in the following school-based program models:
- "One-way" foreign language immersion programs designed for native English-speaking students
- "Two-way" bilingual immersion programs designed for native English-speaking students and native speakers of the program's partner language, such as Spanish
- Developmental bilingual programs designed for minority language learners, such as native Spanish speakers
- Indigenous language immersion programs designed for Native American children in indigenous communities with the goal of revitalizing an endangered language and culture

In dual language and immersion programs, the second/foreign/minority language that students are acquiring is a vehicle to teach school subjects. In order to be considered a dual language or immersion program, the immersion language must be used for at least 50 percent of subject-matter instruction during the elementary school years. In a middle/secondary continuation program, at least two, year-long content courses must be taught in the immersion language.

These programs aim for "additive bilingualism and biliteracy," or the acquisition of another language at no expense to the first, native language.

This unique University certificate program incorporates a coherent set of courses designed specifically for dual language and immersion teachers, and other professionals. Offered by the college's Department of Curriculum and Instruction (C&I), the program was designed jointly by the college's Second Language Education faculty, and representatives of dual language and immersion programs in the Twin Cities metropolitan area.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.
Students currently enrolled in a University of Minnesota graduate-level degree program may also apply.

Other requirements to be completed before admission:
Applicants should either be currently practicing as dual language or immersion educators, or provide evidence of the necessary background and interest (based on a goal statement).

This certificate program is available to graduate-level students only. Coursework taken before completion of the bachelor's degree cannot be applied to the certificate program.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a goal statement (only if applicant is not a practicing dual language or immersion educator). Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Core Courses (12 credits)**
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
- CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
- CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)

**Elective Courses (3 credits)**
Electives will be selected in consultation with faculty advisor, but may include the following:
- CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
Twin Cities Campus
Early Childhood Education M.Ed.
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Road, Minneapolis, MN 55455 (612-625-9778; fax: 612-624-6373)
Email: alle0335@umn.edu
Website: http://icd.umn.edu/academics/early-childhood-education-master-of-education/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32 to 40
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Early Childhood Education MEd prepares outstanding teachers of young children with a strong foundation in child development theory and research and developmentally appropriate methodology for educating the different ages within the early childhood years (birth to age 8). Clinical experiences in the Child Development Laboratory School and in local urban/suburban public schools create a strong experiential base in which to apply the principles and methods learned in University courses. Emphasis is placed on understanding individual learners, working with diverse learners, using a variety of instructional strategies, providing inclusive programming for children with and without special needs, working closely with families, and creating positive classroom communities. The program includes preparation in developing and implementing professional writing and curriculum planning, authentic assessment, documentation of student learning, reflective practice, professional development, and ethics.

This MEd includes coursework that also satisfies initial licensure requirements. Upon completion of all requirements, students are eligible for recommendation for teacher licensure in early childhood education (birth to third grade), which is awarded through the Minnesota Department of Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree must be completed at the time of matriculation.

Required prerequisites
Prerequisite Coursework
Students without an Early Childhood BS from the University, and who wish to pursue Minnesota state licensure, must complete the following prerequisite coursework adopted by PELSB (Professional Educator Licensing and Standards Board). Prerequisites may be completed after admission, but cannot be applied to MEd credit requirements.

Developmental Psychology Courses
CPSY 4331 - Social and Personality Development (3.0 cr)
CPSY 4343 - Cognitive Development (3.0 cr)

Introduction to Child Development
CPSY 5241 - Field Experience in Early Childhood Education (3.0 cr)
CPSY 5251W - Social and Philosophical Foundations of Early Childhood Education [WI] (3.0 cr)
CPSY 5252 - Facilitating Social and Emotional Learning in Early Childhood Education (3.0 cr)
CPSY 5253 - Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)
CPSY 5254 - Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)

**Foundation Courses**
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)

**Elementary Education Foundations**
- CI 3211 - Introduction to Elementary Teaching (3.0 cr)
- CI 3212 - Field Experience: Elementary Teaching (2.0 cr)

**Language and Literacy**

**Linguistics**
- CI 3610 - Linguistics for Teachers [SOCS] (3.0 cr)
- or LING 3001 - Introduction to Linguistics [SOCS] (4.0 cr)
- or ENGL 3601 - Analysis of the English Language (4.0 cr)
- or CPSY 4345 - Language Development and Communication (3.0 cr)

**Literacy**
- CI 3401W - Diversity in Children's Literature [WI] (3.0 cr)
- CI 5413 - Foundations of Reading (3.0 cr)
- CI 5414 - Field Experience: Working with Developing Readers (2.0 cr)

**Cognition**
- EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)

Other requirements to be completed before admission:
Applicants are strongly encouraged to obtain paid or unpaid classroom experience with young children, ages birth to third grade, with multicultural and diverse populations. Students with an undergraduate degree other than the University of Minnesota Twin Cities BS in Early Childhood and who wish to pursue Minnesota state licensure, must complete prerequisite coursework to meet state licensure standards.

**Special Application Requirements:**
Applicants who have completed the Early Childhood BS degree through the University of Minnesota apply for fall admission.

Applicants who have not completed the Early Childhood bachelor's degree at the University of Minnesota can apply for spring, summer, or fall admission.

All applicants must submit the following five required application materials through the online application system:

1. Transcripts - Unofficial transcripts or academic records should be uploaded directly to the online application. International students should also upload an English translation if the transcript is not in English. Please do not mail in paper copies of your transcripts. There is no need for official transcripts or academic records for initial review. If you are admitted, the University will then request official copies of this material.

2. Resume

3. Essay

4. Two Letters of Recommendation - These letters should be written by someone who is knowledgeable about your education-related experiences, work with young children, work style, and personal attributes.

5. Application fee - This fee is charged when you submit your application and is required for each application you submit. Fees must be paid online with a credit card.

Nonnative English speakers and/or international students should also submit an official score report from the Test of English as a Foreign Language (TOEFL).

See full application instructions and deadlines at: https://icd.umn.edu/academics/early-childhood-education-master-of-education/apply/

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Plan C: Plan C requires 32 to 40 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

The University of Minnesota does not award licensure. The Professional Educator Licensing and Standards Board (PELSB) determines licensure for the state of Minnesota in the areas of teacher education and related services.

Early Childhood Education

MEd required coursework

Undergraduate Pathway (32 credits)

Students who transition into the MEd degree from the University's Early Childhood BS take the courses below to earn their MEd.

- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
- CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
- CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
- CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)
- CPSY 5171 - Field Experience: Applying Instructional Methods in the Elementary School (2.0 cr)
- CPSY 5181 - Clinical Experience in Elementary School Teaching (10.0 cr)
- CPSY 5187 - Capstone Project: Improvement of Teaching in Early Childhood Education (2.0 cr)

or Graduate Pathway (38 to 40 credits)

These courses are required for all students who have not earned their undergraduate degree from the University's Early Childhood BS program. Students complete the courses below in addition to the required pre-requisites, which may be taken after admittance into the MEd program. The number of CPSY 5281 credits required is dependent upon teaching placement.

- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
- CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
- CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
- CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)
- CPSY 5171 - Field Experience: Applying Instructional Methods in the Elementary School (2.0 cr)
- CPSY 5181 - Clinical Experience in Elementary School Teaching (10.0 cr)
- CPSY 5187 - Capstone Project: Improvement of Teaching in Early Childhood Education (2.0 cr)
- CPSY 5281 - Student Teaching in Early Childhood Education (6.0 - 8.0 cr)
Twin Cities Campus
Education, Curriculum, and Instruction M.A.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277).
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 41
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for professional roles in K-12 education, postsecondary and research settings, educational service agencies, and business and industry.

The MA degree includes formal tracks in arts in education; elementary education; learning technologies; literacy education; mathematics education; science education; second language education; social studies education; and teaching English to speakers of other languages.

Students must have an interest in research in education or a related field; students plan a program of coursework that prepares them to conduct scholarly research in an area of expertise related to a track or tracks listed above.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Generally a bachelor's degree with licensure and/or teaching experience fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of undergraduate coursework determined acceptable by advisors and the director of graduate studies is adequate.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the GRE, scores from the TOEFL/IELTS/MELAB (if applicable), three letters of recommendation from individuals familiar with their scholarship and research potential, a resume, a clearly written statement of career interests, goals, and objectives, and a diversity statement. Some program tracks require an example of academic writing. Master's applications are reviewed by department faculty once per academic year, with December 1 as the deadline.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
IELTS
  - Total Score: 6.5
MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 15 to 26 major credits, 5 to 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 to 26 major credits and 6 to 8 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: All MA students must demonstrate familiarity with the tools of research or scholarship in their major track, the ability to work independently, and the ability to present their work effectively.

Plan B paper(s) are less formal than the Plan A thesis and may build more directly from coursework; papers should involve deep engagement of the research literature. A paper done for a course may serve as one of the Plan B papers, with the understanding that it would be extended and revised under the advisor’s supervision.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: For TESOL track only

A minimum GPA of 3.00 is required for students to remain in good standing.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Arts in Education
The MA program’s arts in education track presents opportunities for students with experience in schools or other educational settings to develop their ability to work at the intersection of theory and practice. Gaining the knowledge and skills necessary to be reflective and well-informed art educators, graduates become educational leaders in many contexts—school districts, museums, community arts organizations, government agencies—or often pursue further graduate study. Students are encouraged to take courses both across the College of Education and Human Development and the University at large and typically fulfill program requirements by exploring issues of teaching, learning, curriculum, teacher education, and school reform in urban and suburban schools, several renowned art museums in the greater Minneapolis area, and within the initial teacher licensure program at the University. The course of study is planned in consultation with the adviser to meet the academic interests and background of the students; those needs are balanced with the expected foundations in research and scholarship. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

Program faculty exhibit a strong commitment to curriculum innovation, issues of social justice and diversity, and life-long aesthetic and artistic development.

Plan A or Plan B
Arts in Ed - Plan A
Total: 31 credits

Major Coursework (15 credits)
Take the following courses. Select additional credits in consultation with the advisor to complete the 15 credits required.
CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)
CI 8079 - Arts Based Research in Education (3.0 cr)
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Thesis Credits**
Take 10 masters thesis credits.
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Arts in Ed - Plan B**
Total: 30 credits

**Major Coursework (18 credits)**
Take the following courses. Select additional credits in consultation with the advisor to complete the 18 credits required.

CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)
CI 8079 - Arts Based Research in Education (3.0 cr)

**Research Coursework (6 credits)**
Take CI 8095 for 3 credits. Select additional credits in consultation with the advisor to complete the 6 credits required.
CI 8095 - Problems: Art Education (1.0 - 12.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Elementary Education**
The MA program's elementary education track is designed to help professionals acquire and contribute to the advancement of knowledge and leadership so necessary to address the dynamic challenges of contemporary education at the elementary level. Emphasized within the track are, for example, the following: a focus on interdisciplinary approaches to curriculum development, the use of inquiry as a key pedagogical approach, the importance of a strong understanding of diversity and its social and educational implications, and child development and learning theories as the foundation for research and teaching elementary settings.

**Plan A or Plan B**

**Elem Ed - Plan A**
Total: 31 credits

**Major Coursework (15 credits)**
Take the following courses. Select additional credits in consultation with the advisor to complete the 15 credits required.

CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Thesis Credits**
Take 10 masters thesis credits.
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Elem Ed - Plan B**
Total: 30 credits

**Major Coursework (18 credits)**
Select credits in consultation with the advisor.

**Research Coursework (6 credits)**
Take CI 8195 for 3 credits. Select additional credits in consultation with the advisor to complete the 6 credits required.
CI 8195 - Problems: Improvement of Instruction (1.0 - 6.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Learning Technologies**
The learning technologies (LT) MA track prepares people for research and practice related to multimedia, design, K-12 technology integration, and online distance learning. MA graduates often conduct research and engage in LT-related practice in K-12, higher education, or business or industry, such as software companies. LT coursework includes hands-on learning and use of current technologies, development of technological solutions, consideration of theory and research, and conducting educational research.

The MA's LT track is targeted at students interested in a stronger research orientation than those who pursue the master of education degree. MA students, who often continue to a PhD program, are required to take courses in research methodology and to write a Plan
A thesis or Plan B paper to complete their degree. Master's degrees extend the content in the certificate programs and include various courses taken from inside and outside the program. Students may engage in advanced media and software design and development or develop plans for technology integration for diverse educational settings.

**Plan A or Plan B**

**LT - Plan A**
Total: 34 credits

**Major Coursework (18 credits)**
Take the following courses. Select additional credits in consultation with the advisor to complete the 18 credits required.
- CI 5331 - Introduction to Learning Technologies (3.0 cr)
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Thesis Credits**
Take 10 masters thesis credits.
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**LT - Plan B**
Total: 30 credits

**Major Coursework (18 credits)**
Take the following courses. Select additional credits, preferably in the technology certificate area, in consultation with the advisor to complete the 18 credits required.
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5331 - Introduction to Learning Technologies (3.0 cr)

**Research Coursework (6 credits)**
Take CI 8395 for 3 credits. Select additional credits in consultation with the advisor to complete the 6 credits required.
- CI 8395 - Directed Study: Learning Technologies (1.0 - 6.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Literacy Education**
The MA program's literacy track is thoughtfully designed to balance theory with practical application in a variety of educational settings. There is a deep foundation in evaluating current research and students are encouraged to contribute meaningfully to research in the field of literacy. Faculty members and students work together to study at the intersection of the strands of literacy: children's and adolescent literature, critical literacies, English education, language arts, and reading. Literacy research related to diverse learners in urban, multilingual settings is a central focus of the program. The course of study is planned in consultation with the adviser to meet the academic interests and background of the students; those needs are balanced with the expected foundations in research and scholarship. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

**Plan A or Plan B**

**Lit Ed - Plan A**
Total: 31 credits

**Major Coursework (15 credits)**
Take the following courses. Select additional credits, including at least 1 Literacy Education seminar, in consultation with the advisor to complete the 15 credits required.
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Thesis Credits**
Take 10 masters thesis credits.
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Lit Ed - Plan B**
Total: 30 credits
Major Coursework (18 credits)
Select credits including at least 1 Literacy Education seminar, in consultation with the advisor to complete the 18 credits required.

Research Coursework (6 credits)
Take CI 8495 for 3 credits. Select additional credits in consultation with the advisor to complete the 6 credits required.

CI 8495 - Problems: Teaching English and Reading (1.0 - 6.0 cr)

Outside Coursework (6 credits)
Select credits in consultation with the advisor.

Mathematics Education
The MA program's mathematics education track prepares students for research and practice related to K-12 mathematics and engineering education. The MA is targeted at students interested in a stronger research orientation than those who pursue the master of education (MEd) degree. MA students, who often continue on to a PhD program, are required to take courses in research methodology and to write a Plan A or Plan B paper to complete their degree. Graduate students participate in this work as teaching assistants, research assistants in externally funded projects, and as instructors.

Plan A or Plan B

Math Ed - Plan A
Total: 31 credits

Major Coursework (12 credits)
Take the following courses:
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
CI 8572 - Learning Theory and Classical Research in STEM Education (3.0 cr)
MTHE 8571 - Research in Mathematics Education (3.0 cr)

Major Electives (3 credits)
Select 1 of the following courses in consultation with the advisor. If a variable-credit course is chosen, take it for 3 credits.
MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
MTHE 5171 - Teaching Problem Solving (3.0 cr)
MTHE 5172 - Teaching Probability and Statistics (3.0 cr)
MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
MTHE 8591 - Seminar: Mathematics Education (1.0 - 3.0 cr)

Outside Coursework (6 credits)
Select credits in consultation with the advisor.

Thesis Credits
Take 10 masters thesis credits.

CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Math Ed - Plan B
Total: 30 credits

Major Coursework (15 credits)
Select credits in consultation with the advisor.

Research Coursework (9 credits)
Take the following courses. Take MTHE 8995 for 3 credits. Select additional credits in consultation with the advisor to complete the 9 credits required.
MTHE 8571 - Research in Mathematics Education (3.0 cr)
MTHE 8995 - Problems: Mathematics Education (1.0 - 6.0 cr)

Outside Coursework (6 credits)
Select credits in consultation with the advisor.

Science Education
The MA program's science education track is designed to prepare scholars to conduct thoughtful research in order to assume roles as university faculty members, educational leaders, policy makers, and researchers and to contribute meaningfully to the field. The field of science education is a broad one and includes science and environmental education at the K-12 levels, the college level, in informal and adult settings, and in early childhood. Focus areas of research within the science education area are the preparation of pre-service science teachers (K-12), induction and mentoring of beginning science teachers, design and implementation of curricula across the K-college spectrum, environmental education, cooperative learning, and social justice.

Plan A or Plan B

Sci Ed - Plan A
Total: 31 credits

Major Coursework (15 credits)
Take the following courses. Take CI 8570 for 3 credits.
CI 5535 - Foundations of Science Education (3.0 cr)
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
CI 8570 - Advanced Topics in Science Education (1.0 - 4.0 cr)
CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)

Outside Coursework (6 credits)
Select credits in consultation with the advisor.

Thesis Credits
Take 10 masters thesis credits.
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Sci Ed - Plan B
Total: 30 credits

Major Coursework (18 credits)
Take the following courses. Take 8570 twice for a total of 6 credits. Select additional credits in consultation with the advisor to complete the 18 credits required.
CI 5535 - Foundations of Science Education (3.0 cr)
CI 8570 - Advanced Topics in Science Education (1.0 - 4.0 cr)
CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)

Research Coursework (6 credits)
Take CI 8595 for 3 credits. Select additional credits in consultation with the advisor to complete the 6 credits required.
CI 8595 - Problems: Science Education (1.0 - 6.0 cr)

Outside Coursework (6 credits)
Select credits in consultation with the advisor.

Second Language Education
The second language education (SLE) track is nationally and internationally known for its programs, which focus on English as a second language (ESL) for K-12, postsecondary, and adult classrooms; bilingual and immersion education; and traditional foreign language education in both K-12 and postsecondary settings. The program's perspective on language learning and teaching is markedly pedagogical and informed by an awareness of the role social context plays in the process of language learning and teaching. Master's students in the SLE track engage in coursework and projects that balance theory and research with practical application. Students pursue a course of study that is designed in collaboration with the faculty adviser to correspond to the interests and background of each student and to provide a solid understanding of research and best practice in the field. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

Plan A or Plan B

SLE - Plan A
Total: 30 credits

Major Coursework (15 credits)
Take a minimum of 15 credits. If CI 5654 is chosen, it should be taken for 4 credits.
Take 15 or more credit(s) from the following:
• CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
• CI 5646 - English Grammar for ESL Teachers (3.0 cr)
• CI 5649 - Language Analysis for ESL Teaching in Higher Ed (3.0 cr)
• CI 5654 - Practicum in Language Teaching: ESL and World Languages (1.0 - 6.0 cr)
• CI 5658 - Language Testing and Assessment (3.0 cr)
• CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
  or CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
• CI 5662 - Second Language Curriculum Design (3.0 cr)
  or CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
• CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
  or CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
• CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
  or CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)

Outside Coursework (5 credits)
Select credits in consultation with the faculty advisor.

Thesis Credits
Take 10 masters thesis credits.
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
SLE - Plan B

Total: 30 credits

**Major Coursework (15 credits)**
Take a minimum of 15 credits. If CI 5654 is chosen, it should be taken for 4 credits.

Take 15 or more credits from the following:

- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (2.0 cr)
- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)
- CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
- CI 5649 - Language Analysis for ESL Teaching in Higher Ed (3.0 cr)
- CI 5654 - Practicum in Language Teaching: ESL and World Languages (1.0 - 6.0 cr)
- CI 5658 - Language Testing and Assessment (3.0 cr)
- CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
- CI 5662 - Second Language Curriculum Design (3.0 cr)
- CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)

**Research Coursework (9 credits)**
Student should take the Plan B paper course - CI 8695 - for 3 credits. Other research courses selected in consultation with faculty adviser.

- CI 8695 - Problems: Second Languages and Cultures Education (1.0 - 6.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the faculty advisor.

**Social Studies Education**
The MA's social studies education track focuses on issues related to curriculum, instruction and assessment in K-12 social studies. Graduate students are strongly encouraged to present research papers at professional conferences, specifically the National Council for the Social Studies and the American Educational Research Association.

Faculty maintain active research agendas with several research centers at the University including the Center for Applied Research and Educational Improvement, housed within the College of Education and Human Development, and two research centers housed outside the College: the Center for Environmental Learning and Leadership and the Center for the Study of Political Psychology. Social studies faculty research interests include the areas of political socialization, political tolerance, authentic assessment, citizenship and civics education, and democratic thought. In addition, faculty members engage in research centered on the history of curricula, multicultural and gender studies, and social justice.

**Plan A or Plan B**

Soc Stud Ed - Plan A

Total: 32 credits

**Major Coursework (16 credits)**
Take the following courses. Take at least 1 credit of CI 8796. Select additional credits in consultation with the advisor to complete the 16 credits required.

- CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
- CI 8796 - Research Internship in Social Studies Education (1.0 - 6.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Thesis Credits**
Take 10 masters thesis credits.

- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Soc Stud Ed - Plan B

Total: 30 credits

**Major Coursework (18 credits)**
Select 18 credits in consultation with the advisor.

**Research Coursework (6 credits)**
Take CI 8795 for 3 credits. Select additional credits in consultation with the advisor to complete the 6 credits required.

CI 8795 - Problems: Social Studies Education (1.0 - 6.0 cr)

**Outside Coursework (6 credits)**
Select credits in consultation with the advisor.

**Teaching English to Speakers of Other Languages**
The teaching English to speakers of other languages (TESOL) track focuses on the broad field of applied linguistics uniting research, teaching and service in addressing the second language learning needs of adult learners in the university and the wider community, both in the US and abroad. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

**Plan A or Plan B**

**TESOL - Plan A**
Total: 41 credits

**Major Coursework (26 credits)**
Take the following courses. Take CI 5654 for 4 credits.

CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5649 - Language Analysis for ESL Teaching in Higher Ed (3.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5654 - Practicum in Language Teaching: ESL and World Languages (1.0 - 6.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5658 - Language Testing and Assessment (3.0 cr)

**Second Language Acquisition**
Select 1 of the following courses, in consultation with the advisor, to complete the 26 credits required.

CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)

**Outside Coursework (5 credits)**
Select credits in consultation with the advisor.

**Thesis Credits**
Take 10 masters thesis credits.

CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**TESOL - Plan B**
Total: 34 credits

**Major Coursework (26 credits)**
Take the following courses. Take CI 5654 for 4 credits.

CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5649 - Language Analysis for ESL Teaching in Higher Ed (3.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5654 - Practicum in Language Teaching: ESL and World Languages (1.0 - 6.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5658 - Language Testing and Assessment (3.0 cr)

**Second Language Acquisition**
Select 1 of the following courses, in consultation with the advisor, to complete the 26 credits required.

CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)

**Outside Coursework (8 credits)**
Select credits in consultation with the advisor.
Twin Cities Campus
Education, Curriculum, and Instruction Minor
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for professional roles in preK-12 education, postsecondary and research settings, educational service agencies, and business and industry.

The minor in education, curriculum and instruction may include a focus in any one of the available tracks: arts in education; culture and teaching (at the doctoral level only); elementary education; learning technologies; literacy education; mathematics education; science education; second language education; and social studies education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students must consult with the Director of Graduate Studies in the Department of Curriculum & Instruction regarding specific coursework and committee involvement for the minor. The Director of Graduate Studies gives final approval for the minor coursework submitted on the Graduate Degree Plan or Graduate Planning & Audit System (GPAS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
A minor at the master's level requires a minimum of 6 credits of CI-designated coursework selected in consultation with the director of graduate studies.

Doctoral
Doctoral (12 Credits)
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Electives (6 Credits)
Courses will be selected in consultation with the director of graduate studies.
Twin Cities Campus
Education, Curriculum, and Instruction Ph.D.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277).
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 75
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for academic and professional roles in K-12 education, post-secondary education, research settings, educational service agencies, and business and industry.

The PhD degree includes formal tracks in the following: arts in education; culture and teaching; elementary education; learning technologies; literacy education; science, technology, engineering and mathematics (stem) education; second language education; and social studies education.

Students must have an interest in research in education or a related field; students plan a program of coursework that prepares them to conduct scholarly research in an area of expertise related to a track listed above.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is preferred for admission to some of the tracks within the PhD program, but it is not always required.

Other requirements to be completed before admission:
Generally a bachelor's degree with licensure and/or teaching experience fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of undergraduate coursework determined acceptable by faculty is adequate.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the GRE, scores from the TOEFL/IELTS/MELAB (if applicable), three letters of recommendation from individuals familiar with their scholarship and research potential, a clearly written statement of career interests, goals, and objectives, a diversity statement, and a resume. Some program tracks require an example of academic writing. Doctoral applications are reviewed by department faculty once per academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Paper Based - Total Score: 550

IELTS
- Total Score: 6.5

MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
39 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

A total of 75 credits is required for the education, curriculum and instruction PhD program. Requirements include core coursework required by all students, major coursework in the student's selected track, research methodology coursework, and a minimum of 12 credits in a minor or supporting program. All PhD students must also complete 24 doctoral thesis credits. Specific courses and additional work vary depending upon the track and are planned in consultation with the faculty advisor.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.

Arts in Education
The PhD program's arts in education track presents opportunities for students with experience in schools or other informal educational settings to develop necessary philosophical, theoretical, and methodological competence to make scholarly contributions to the field. Working as researchers, scholars, policy makers, and practitioners, graduates become educational leaders in universities, colleges, K-12 school districts, museums, community arts organizations, and government agencies.

Students typically carry out dissertation inquiry in local urban and suburban schools, several renowned art museums in the Minneapolis-St. Paul area, and within the initial teacher licensure program at the University. Both qualitative and quantitative research methods have guided PhD candidates' inquiry on the following: rightness of aesthetic-based problem solving, design thinking, and media arts theory and practice in arts classrooms; teaching critical literacy in and through the arts; innovation in culture-based arts education; and other knowledge building questions specific to art teacher development and retention.

Faculty and students are committed to understanding equity and social justice in both research and teaching. Graduate students often work closely with faculty in the development, implementation, and evaluation of national, state, and local arts education initiatives.

Arts in education students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 15 credits. CI 8085 is a required course as well, though it may be taken as either a major requirement course or as a research elective course.
CI 5075 - The Social, Historical and Cultural Foundations of Arts Education (3.0 cr)
CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)
CI 8079 - Arts Based Research in Education (3.0 cr)

Research Coursework
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Research Electives
9 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.
Take 9 or more credits from the following:

• AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
• ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
• CI 8079 - Arts Based Research in Education (3.0 cr)
• CI 8085 - Narrative Inquiry in Education (3.0 cr)
• CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
• CI 8146 - Critical Ethnography in Education (3.0 cr)
• CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
• CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
• CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
• CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
• CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
• CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
• CI 8689 - Language and Education Policy (3.0 cr)
• CI 8913 - Interpretive Research (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
• EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• GWSS 8109 - Feminist Knowledge Production (3.0 cr)
• LING 5462 - Field Research in Spoken Language (3.0 cr)
• OLPD 5056 - Case Studies for Policy Research (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
• OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor

Elective
3 credits selected in consultation with faculty advisor

Culture and Teaching

The culture and teaching (CaT) track engages the study of education as a cultural phenomenon. Students in CaT study a range of educational processes that take place both in and beyond the borders of schools, and explore alternative epistemologies and pedagogies. Faculty and students are dedicated to seeking better understandings of issues pertaining to equity and social justice in both research and teaching. The track is interdisciplinary and collaborative, so students' work will encompass many different approaches, methods, and perspectives.

Some of CaT's courses focus on the ways in which teachers are prepared to teach; engage in ongoing professional development; and develop their own personal and professional identities within collegial communities. Other courses examine the salience of understanding white racial identity for pedagogy and social change; as well as the implications of globalization and immigration for teaching, learning, and curriculum. Still other courses explore popular culture and media in relation to contemporary critical theory and teaching practices. "Culture" in CaT includes thinking about "high" and "popular" cultures, the cultures of teaching and the cultures of learning, and how our responses to all influence and are influenced by everyday meanings and practices.
CaT students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

**Core Coursework**
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

**Major Coursework**
15 credits total, with 9 credits selected in consultation with faculty advisor. CI 8159 will be taken twice for a total of 6 credits.
- CI 8159 - Culture and Teaching Colloquium (3.0 cr)

**Research Coursework**
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

**Research Electives**
9 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.

Take 9 or more credit(s) from the following:
- AMST 8299 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- CI 8079 - Arts Based Research in Education (3.0 cr)
- CI 8085 - Narrative Inquiry in Education (3.0 cr)
- CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
- CI 8146 - Critical Ethnography in Education (3.0 cr)
- CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
- CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
- CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
- CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
- CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
- CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
- CI 8689 - Language and Education Policy (3.0 cr)
- CI 8913 - Interpretive Research (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
- EPSY 8224 - Performance Assessment and Analysis (3.0 cr)
- EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- GWSS 8109 - Feminist Knowledge Production (3.0 cr)
- LING 5462 - Field Research in Spoken Language (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 8205 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
- OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

**Minor or Supporting Program**
12 credits outside the track, selected in consultation with faculty advisor

**Elective**
3 credits selected in consultation with faculty advisor

**Elementary Education**
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.
The PhD program's elementary education track is designed to help professionals acquire and contribute to the advancement of knowledge and leadership necessary to address the dynamic challenges of contemporary education at the elementary level. Emphasized within the track are, for example, the following: a focus on interdisciplinary approaches to curriculum development, the use of inquiry as a key pedagogical approach, the importance of a strong understanding of diversity and its social and educational implications, and child development and learning theories as the foundation for research and teaching in elementary settings.

Elementary students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
- 15 credits selected in consultation with faculty advisor

Research Coursework
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Research Electives
- 9 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.
  
  Take 9 or more credit(s) from the following:
  
  • AMST 8299 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
  • ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
  • CI 8079 - Arts Based Research in Education (3.0 cr)
  • CI 8085 - Narrative Inquiry in Education (3.0 cr)
  • CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
  • CI 8146 - Critical Ethnography in Education (3.0 cr)
  • CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
  • CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
  • CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
  • CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
  • CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
  • CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
  • CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
  • CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
  • CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
  • CI 8689 - Language and Education Policy (3.0 cr)
  • CI 8913 - Interpretive Research (3.0 cr)
  • EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
  • EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
  • EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
  • EPSY 5261 - Introductory Statistical Methods (3.0 cr)
  • EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
  • EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
  • EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
  • EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
  • EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
  • EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
  • EPSY 8251 - Statistical Methods in Education I (3.0 cr)
  • EPSY 8252 - Statistical Methods in Education II (3.0 cr)
  • EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
  • EPSY 8265 - Factor Analysis (3.0 cr)
  • EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
  • EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
  • EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
  • EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
  • GWSS 8109 - Feminist Knowledge Production (3.0 cr)
  • LING 5462 - Field Research in Spoken Language (3.0 cr)
  • OLPD 5056 - Case Studies for Policy Research (3.0 cr)
  • OLPD 5061 - Ethnographic Research Methods (3.0 cr)
  • OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
  • OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

Minor or Supporting Program
- 12 credits outside the track, selected in consultation with faculty advisor

Elective
3 credits selected in consultation with faculty advisor

Learning Technologies
The PhD's learning technologies (LT) track prepares students for research and practice related to multimedia, design, K-12 technology integration, and online distance learning. PhD graduates often earn academic positions in higher education or become directors and leaders of development or research within business and industry. Coursework in LT includes hands-on learning and use of current technologies, development of technological solutions, research methods, and theory of curriculum, instruction, and learning.

The PhD degree is targeted primarily at students interested in pursuing research careers. Student research, culminating in a dissertation, typically evaluates various learning technologies issues and interventions. Common areas of study include conditions affecting educational technology use in schools, higher education, and business settings, and tend to focus on psychological, sociological, and philosophical factors. For example, recent graduates have studied the impact of technology on learning and cognition, variables that mediate effective technology use in education, and issues related to ethical technology use.

LT students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
15 credits selected in consultation with faculty advisor

Research Coursework
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Research Electives
9 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.
Take 9 or more credit(s) from the following:
• AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
• ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
• CI 8079 - Arts Based Research in Education (3.0 cr)
• CI 8085 - Narrative Inquiry in Education (3.0 cr)
• CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
• CI 8146 - Critical Ethnography in Education (3.0 cr)
• CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
• CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
• CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
• CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
• CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
• CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
• CI 8689 - Language and Education Policy (3.0 cr)
• CI 8913 - Interpretive Research (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
• EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• GWSS 8109 - Feminist Knowledge Production (3.0 cr)
• LING 5462 - Field Research in Spoken Language (3.0 cr)
• OLPD 5056 - Case Studies for Policy Research (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
• OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor

Elective
3 credits selected in consultation with faculty advisor

Literacy Education
The Literacy Education track helps students become literacy leaders. Working in schools and other educational settings, students develop an understanding of literacy as a set of socially and culturally situated practices. We take literacy to be plural and intersectional, defined by a range of skills that enable us to navigate multiple disciplines and thrive as lifelong learners. Faculty and students cooperate on projects that advance theory, research, and practice in the (overlapping) core areas of reading education, children's and adolescent literature, critical literacy, English education, translanguaging literacy, as well as multimodal, digital, and culturally-relevant literacies.

We are committed to equity and a vision of an inclusive future. To advance these goals,
- we engage in research, teaching, and outreach that supports culturally and linguistically diverse learners,
- we advance understanding of children's literature as a force for social transformation,
- we develop literacy teachers and leaders for diverse schools,
- we apply multiple theoretical and research perspectives to problems and questions central to the field of literacy,
- we advocate for justice literacy, race literacy, eco-literacy, digital literacy, and other new literacies as tools that empower us to face global challenges,
- we strive to influence literacy policies to address inequities and benefit all learners.

Literacy students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
Required course is listed; others selected in consultation with faculty advisor for a total of 15 credits.
- CI 8431 - Literacy Seminar: Literacy in a Post-Truth Era (3.0 cr)

Research Coursework
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Research Electives
9 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.
Take 9 or more credit(s) from the following:
- AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- CI 8079 - Arts Based Research in Education (3.0 cr)
- CI 8085 - Narrative Inquiry in Education (3.0 cr)
- CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
- CI 8146 - Critical Ethnography in Education (3.0 cr)
- CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
- CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
- CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
- CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
- CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
- CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
- CI 8689 - Language and Education Policy (3.0 cr)
- CI 8913 - Interpretive Research (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
• EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• GWSS 8109 - Feminist Knowledge Production (3.0 cr)
• LING 5462 - Field Research in Spoken Language (3.0 cr)
• OLPD 5056 - Case Studies for Policy Research (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
• OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

Minor or Supporting Program
Minor or Supporting Program

Elective
3 credits selected in consultation with faculty advisor

Science, Technology, Engineering, and Mathematics Education

The doctoral program's STEM education track at the University of Minnesota is interdisciplinary, focusing on science education, mathematics education, engineering education or agricultural education. Students pursuing this track will choose an area of emphasis in one of the four specializations, while simultaneously participating in scholarly work that spans all areas of STEM education. This integrated-style is one of the first in the nation, and is designed to prepare scholars to conduct thoughtful disciplinary and interdisciplinary research in STEM education in order to assume roles as university faculty members, educational leaders, policy makers, and researchers.

STEM students must take 6 credits of core coursework, 9 credits of STEM core coursework, 9 credits of focus area specific (science or mathematics or engineering or agriculture) coursework, 15 credits of research coursework, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

STEM Core Coursework
CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)
CI 8572 - Learning Theory and Classical Research in STEM Education (3.0 cr)
CI 8573 - Nature of Inquiry in STEM Education (3.0 cr)

STEM Focus Area Coursework
Students take 9 credits, with faculty advisor approval, in their focus area: science education or mathematics education or engineering education or agricultural education.

Science Education
3 required credits are listed; 6 additional credits must be taken in consultation with faculty advisor.

or Mathematics Education
9 credits required in consultation with faculty advisor

or Engineering Education
9 credits required in consultation with faculty advisor

or Agricultural Education
6 required credits are listed; one additional "AFEE" 3 credit course must be taken in consultation with faculty advisor.

Research Coursework
Students must take CI 8134 and CI 8135, as well as a minimum of 6 credits of statistics and one research elective course, for a total of 15 credits.

CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Statistics Requirement
Students must take a minimum of 6 credits of graduate-level Statistics in consultation with their advisor.

Research Electives
3 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.

Take 3 or more credit(s) from the following:

- **AMST 8289** - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- **ANTH 8203** - Research Methods in Social and Cultural Anthropology (3.0 cr)
- **CI 8079** - Arts Based Research in Education (3.0 cr)
- **CI 8085** - Narrative Inquiry in Education (3.0 cr)
- **CI 8145** - Using Mixed Methods in Educational Research (3.0 cr)
- **CI 8146** - Critical Ethnography in Education (3.0 cr)
- **CI 8147** - Critical Discourse Analysis in Educational Research (3.0 cr)
- **CI 8148** - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- **CI 8149** - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- **CI 8153** - Research Approaches to Classroom Discourse (3.0 cr)
- **CI 8155** - Immigrant Families and U.S. Schools (3.0 cr)
- **CI 8165** - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
- **CI 8371** - Applied Social Network Analysis in Education (3.0 cr)
- **CI 8645** - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- **CI 8671** - Sociolinguistic Research Approaches to Education (3.0 cr)
- **CI 8689** - Language and Education Policy (3.0 cr)
- **CI 8913** - Interpretive Research (3.0 cr)
- **EPSY 5221** - Principles of Educational and Psychological Measurement (3.0 cr)
- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **EPSY 5244** - Survey Design, Sampling, and Implementation (3.0 cr)
- **EPSY 8215** - Advanced Research Methodologies in Education (3.0 cr)
- **EPSY 8222** - Advanced Measurement: Theory and Application (3.0 cr)
- **EPSY 8224** - Performance Assessment Design and Analysis (3.0 cr)
- **EPSY 8225** - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- **EPSY 8226** - Item Response Models: Theory and Applications (3.0 cr)
- **EPSY 8251** - Statistical Methods in Education I (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)
- **EPSY 8264** - Advanced Multiple Regression Analysis (3.0 cr)
- **EPSY 8265** - Factor Analysis (3.0 cr)
- **EPSY 8266** - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- **EPSY 8267** - Applied Multivariate Analysis (3.0 cr)
- **EPSY 8268** - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- **EPSY 8282** - Statistical Analysis of Longitudinal Data (3.0 cr)
- **GWSS 8109** - Feminist Knowledge Production (3.0 cr)
- **LING 5462** - Field Research in Spoken Language (3.0 cr)
- **OLPD 5056** - Case Studies for Policy Research (3.0 cr)
- **OLPD 5061** - Ethnographic Research Methods (3.0 cr)
- **OLPD 8105** - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
- **OLPD 8502** - Advanced Evaluation Theory and Theory crafting (3.0 cr)

### Minor or Supporting Program

12 credits outside the track, selected in consultation with faculty advisor.

### Second Language Education

The PhD track in second language education (SLE) focuses on the study of language use, teaching, learning, and policy across a range of educational and community settings, including programs that serve language minority and language majority learners: ESL/EFL, foreign language education, and bilingual and immersion education. The PhD track is designed to assume roles as university faculty members, researchers, policy makers, and educational leaders. Independent scholarship is the cornerstone of the PhD.

The SLE PhD track has four specializations that correspond to the program's primary focus areas and faculty expertise:

1. **Second language acquisition and classroom discourse research** examines language learning processes and the way language is used by learners and their interlocutors in or out of school.
2. **Second language pedagogy and teacher development research** examines teachers' classroom practices and strategies as well as professional identities, experiences, and attitudes.
3. **Language policy research** involves analysis of the formation, implementation, and negotiation of language policy in national, school, community, and private spheres.
4. **Languages and cultures across schools and communities** research examines connections across homes, schools, and communities with an emphasis on the experience.

SLE students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student’s faculty advisor. 24 doctoral thesis credits are also required.

### Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 15 credits.
CI 8161 - Research Experience I: Study Design and Planning (3.0 cr)
CI 8162 - Research Experience II: Data Analysis and Manuscript Preparation (3.0 cr)

Research Coursework
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Research Electives
9 additional credits to be selected based upon student’s research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.
Take 9 or more credits from the following:
• AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
• ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
• CI 8079 - Arts Based Research in Education (3.0 cr)
• CI 8085 - Narrative Inquiry in Education (3.0 cr)
• CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
• CI 8146 - Critical Ethnography in Education (3.0 cr)
• CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
• CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
• CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
• CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
• CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
• CI 8445 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
• CI 8689 - Language and Education Policy (3.0 cr)
• CI 8913 - Interpretive Research (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
• EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• GWSS 8109 - Feminist Knowledge Production (3.0 cr)
• LING 5462 - Field Research in Spoken Language (3.0 cr)
• OLPD 5056 - Case Studies for Policy Research (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
• OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor.

Elective
3 credits selected in consultation with faculty advisor.

Social Studies Education
The PhD program's social studies education track focuses on issues related to curriculum, instruction, and assessment in K-12 social studies. Full-time graduate students generally have opportunities to supervise student teachers, teach introductory social studies classes, and conduct and publish research with one or more faculty members. Doctoral students are required to complete a research internship with one or more of the faculty as part of their study for the degree. Graduate students are strongly encouraged to present research papers at professional conferences, specifically the National Council for the Social Studies and the American Educational Research Association. Recent PhD graduates have conducted research in the areas of intercultural relations, moral development,
multicultural gender-fair curriculum, social studies instructional issues, and the standards movement as it relates to social studies education. Graduates have assumed positions as instructional leaders in the public schools, curriculum development specialists, social studies assessment specialists, and college/university faculty.

Social Studies students must take 6 credits of core coursework, 15 credits of major coursework, 15 credits of research coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

### Core Coursework
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

### Major Coursework
15 credits selected in consultation with faculty advisor.

### Research Coursework
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

### Research Electives
9 additional credits to be selected based upon student's research methodology. If student wishes to take a course not selected below, they should first consult with their faculty advisor to make sure it will count as a research elective.

Take 9 or more credit(s) from the following:
- AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- CI 8079 - Arts Based Research in Education (3.0 cr)
- CI 8085 - Narrative Inquiry in Education (3.0 cr)
- CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
- CI 8146 - Critical Ethnography in Education (3.0 cr)
- CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
- CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CI 8153 - Research Approaches to Classroom Discourse (3.0 cr)
- CI 8155 - Immigrant Families and U.S. Schools (3.0 cr)
- CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
- CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
- CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
- CI 8689 - Language and Education Policy (3.0 cr)
- CI 8913 - Interpretive Research (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
- EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
- EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- GWSS 8109 - Feminist Knowledge Production (3.0 cr)
- LING 5462 - Field Research in Spoken Language (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
- OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

### Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor.

### Elective
3 credits selected in consultation with faculty advisor.
Twin Cities Campus
Educational Psychology M.A.
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Educational Psychology MA program has five tracks: counselor education (CE); school psychology; special education (including applied behavior analysis); psychological foundations of education (with emphases in learning and cognition/educational technology, social psychological and social developmental processes in educational psychology, including human relations); and quantitative methods in education (with emphases in measurement/evaluation and statistics/statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants apply online by submitting a department application, three letters of recommendation, and a statement of goals and interests. Applications should be accompanied by official transcripts from all colleges and universities attended.

Application deadlines are December 1 for the quantitative methods and special education tracks; January 17 for the counselor education track; March 1 for the psychological foundations track, and as a second deadline for the quantitative methods track. School psychology does not offer the MA as a terminal degree.

To be considered for fellowship nominations, applications must be submitted by the December 1 deadline.

Due to the various impacts of the COVID-19 global pandemic, the counselor education, psychological foundations and special education tracks will not require the GRE in the application for admissions for fall 2022.

The quantitative methods track does require the GRE in the application for admissions.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 to 24 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 to 60 major credits and 0 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

All courses must be taken A-F unless only offered S/N.

Program Sub-plans

Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

Counselor Education

This sub-plan is limited to students completing the program under Plan B.

The Counselor Education (CE) track subscribes to the scientist/practitioner model, which assumes that scholarly inquiry and counseling practice are interdependent and complementary. The track's primary mission is to prepare counselors to bring a well-trained professional's attitude and interest to bear on the application of counseling and educational knowledge. In addition to becoming skilled clinicians, students learn to be critical consumers and producers of both quantitative and qualitative research. Emphasis areas: clinical mental health, school counseling and an individualized plan emphasis.

The CE track requires 60 credits, completion of Key Performance Indicators, and a written final examination.

Summer classes are a requirement of the program.

All coursework must be taken on the A-F grading basis with a minimum cumulative GPA of 3.0; no more than 2 courses graded below B-; and no more than 6 credits of incomplete grades.

Ed Psych Core Courses (12 credits)

Take the following courses:

- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)

Counseling Theory & Practice Courses (30 credits)

Take the following courses:

- EPSY 5402 - Counseling History and Theories (3.0 cr)
- EPSY 5403 - Counseling Diverse Populations (3.0 cr)
- EPSY 5404 - Group Counseling (3.0 cr)
- EPSY 5405 - Career Counseling (3.0 cr)
- EPSY 5406 - Ethics in Counseling (3.0 cr)
- EPSY 5407 - Diagnosis and Treatment in Counseling (3.0 cr)
- EPSY 5408 - Evidence-Based Counseling Relationships (3.0 cr)
- EPSY 5409 - Trauma and Crisis Counseling (3.0 cr)
- EPSY 5437 - Counseling Research Design & Evidence-Based Practices (3.0 cr)
- FSOS 5111 - Introduction to Family Therapy (3.0 cr)

Emphases
Clinical Mental Health Emphasis (18 credits)
Students pursuing the Clinical Mental Health emphasis take the following 18 credits:
- EPSY 5416 - Introduction to Clinical Mental Health Counseling (3.0 cr)
- EPSY 5429 - Advanced Concepts in Community Counseling (3.0 cr)
- EPSY 5439 - Case Conceptualization and Treatment Planning (3.0 cr)
- EPSY 5482 - Practicum in Community and Higher Education Counseling (3.0 cr)
- EPSY 5483 - Internship I (3.0 cr)
- EPSY 5484 - Internship II (3.0 cr)

-OR-

School Counseling Emphasis (18 credits)
Students pursuing the School Counseling emphasis take the following 18 credits. Take 3 credits of EPSY 5435.
- EPSY 5414 - School Counselor Accountability, Advocacy, and Leadership (3.0 cr)
- EPSY 5415 - Counseling Children and Adolescents (3.0 cr)
- EPSY 5435 - Introduction to School Counseling (3.0 cr)
- EPSY 5481 - Practicum in School Counseling (3.0 cr)
- EPSY 5483 - Internship I (3.0 cr)
- EPSY 5484 - Internship II (3.0 cr)

-OR-

Individualized Plan Emphasis (18 credits)
Internship (6 credits)
Students pursuing the Individualized Plan emphasis take the following 6 credits.
- EPSY 5483 - Internship I (3.0 cr)
- EPSY 5484 - Internship II (3.0 cr)

Electives (12 credits)
Students pursuing the Individualized Plan emphasis must choose 12 elective credits. The following courses are pre-approved electives. If a student wants to take a course that is not on this list, they must obtain advisor approval.

Advanced Clinical Mental Health Electives
- EPSY 5429 - Advanced Concepts in Community Counseling (3.0 cr)
- EPSY 5439 - Case Conceptualization and Treatment Planning (3.0 cr)
- EPSY 5482 - Practicum in Community and Higher Education Counseling (3.0 cr)

Advanced School Counseling Electives
- EPSY 5414 - School Counselor Accountability, Advocacy, and Leadership (3.0 cr)
- EPSY 5415 - Counseling Children and Adolescents (3.0 cr)
- EPSY 5435 - Introduction to School Counseling (3.0 cr)
- EPSY 5481 - Practicum in School Counseling (3.0 cr)

Higher Education Electives
- OLDP 5201 - Strategies for Teaching Adults (3.0 cr)
- OLDP 5202 - Perspectives of Adult Learning and Development (3.0 cr)
- OLDP 5701 - U.S. Higher Education (3.0 cr)
- OLDP 5709 - Critical Issues in Higher Education (3.0 cr)
- OLDP 5712 - College Student Development Theory and Practice (3.0 cr)
- OLDP 5721 - Race and Ethnicity in Higher Education (3.0 cr)
- OLDP 5724 - Leadership and Administration of Student Affairs (2.0 - 3.0 cr)

Career Counseling & Coaching Electives
- KIN 5136 - Psychology of Coaching (3.0 cr)
- OLDP 5033 - Foundations of Individual/Organizational Career Development (3.0 cr)
- OLDP 5812 - Consulting for Organization Change (3.0 cr)
- PSY 5501 - Self, Society and Health - What's Work Got To Do With It? (3.0 cr)
- PSY 8502 - Assessment in Counseling Psychology (3.0 cr)

Counseling Research/PhD Prep Electives
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5417 - Counseling Research Practicum (1.0 - 2.0 cr)
- EPSY 5427 - Advanced Counseling Research Practicum (2.0 cr)
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 8013 - Quantitative Family Research Methods (3.0 cr)
- OLDP 5061 - Ethnographic Research Methods (3.0 cr)

Psychological Foundations of Education
Graduate study in psychological foundations of education prepares students for research and teaching positions in colleges and universities. Students have also gone on to positions in professional settings such as schools, private industry, human service organizations, health science units, and government agencies.

The goal of the track is to apply and generate knowledge of psychological processes and methodological procedures involved in...
learning and teaching.

The psychological foundations track offers emphases in learning and cognition/educational technology or social psychological and social developmental (including human relations) processes in educational psychology.

The Plan A requires 24 course credits; 10 thesis credits; a thesis; and a final oral examination. The Plan B option requires 33 course credits; a Plan B paper; and a final written examination.

EPSY courses in the area of emphasis will satisfy Ed Psych core requirement for 3 credits of learning/cognition or social/personality.

**Ed Psych Core Courses (12 credits)**

**Learning/Cognition Course (3 credits)**

Students pursuing the Learning and Cognition/Educational Technology emphasis must select 1 of the following courses. Students pursuing the Social Psychological/Social Developmental Process emphasis must select 1 of the 5-level courses from the list.

EPSY 5101 - Intelligence and Creativity (3.0 cr)
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
EPSY 5119 - Mind, Brain, and Education (3.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)

**Social/Personality Course (3 credits)**

Students pursuing the Social Psychological/Social Developmental Process emphasis must select 1 of the following courses. Students pursuing the Learning/Cognition emphasis must select 1 of the EPSY courses listed.

EPSY 5151 - Cooperative Learning (3.0 cr)
EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 5205 - Applied Social Psychology (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8202 - Close Relationships (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

**Statistics Course (3 credits)**

Select 3 credits from the following:

EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Measurement/Evaluation Course (3 credits)**

Select 3 credits from the following:

EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

**Research Methodology Course (3 credits)**

Take the following course:

EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)

**Plan B Requirements (9 credits)**

**Plan B Paper (6 credits)**

Students must take 6 credits of EPSY 5991 or EPSY 8994.

EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)

**Additional Coursework (3 credits)**

Plan B students select 3 credits, preferably in either learning/cognition or social psychology/social development, in consultation with the advisor.

**Plan A Requirement**

**Thesis Credits**

Plan A students take 10 master's thesis credits.

EPSY 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Emphases**
Learning & Cognition/Educational Technology Emphasis (12 credits)

Required Courses (6 credits)
Select 6 credits from the following:
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)

Specialization Courses (6 credits)
Select 6 credits from the following:
- EPSY 5112 - Mathematical Cognition (3.0 cr)
- EPSY 5113 - The Psychology of Scientific Reasoning (3.0 cr)
- EPSY 5114 - Seminar: Cognition and Learning (3.0 cr)
- EPSY 5115 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 5116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 5119 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
- EPSY 5118 - Advanced Cognitive Psychology (3.0 cr)
- EPSY 8290 - Special Topics: Seminar in Psychological Foundations (1.0 - 6.0 cr)
- EPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)

-OR-

Social Psychological/Social Developmental Processes Emphasis

Required Course (3 credits)
Take the following course:
- EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)

Specialization Coursework (6 credits)
Select 6 credits from the following:
- EPSY 5151 - Cooperative Learning (3.0 cr)
- EPSY 5157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
- EPSY 8290 - Special Topics: Seminar in Psychological Foundations (1.0 - 6.0 cr)
- PSY 5135 - Psychology of Individual Differences (3.0 cr)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8202 - Close Relationships (3.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

Additional Course (3 credits)
Select 3 credits, preferably in either Learning and Cognition/Educational Technology or Social Psychological/Social Developmental Processes, in consultation with the advisor.

Quantitative Methods in Education
This sub-plan is limited to students completing the program under Plan B.

In QME students explore methodologies of measurement/evaluation, and statistics/statistics education to improve our understanding and use of these methods as well as explore new approaches to address educational phenomena. Students specializing in measurement study psychometric theories and methods of developing, selecting, and using measures of knowledge, skills, abilities, and non-cognitive variables. This includes item writing, test design, equating, scaling, and standard setting, techniques supporting decision making and accountability. Students specializing in evaluation study theories and models of evaluation that include quantitative and qualitative techniques for evaluating the effectiveness of educational and human services programs. Students specializing in statistics study a wide range of statistical methods, as well as their underlying statistical theories, and develop an understanding of the relationship between research design and statistical analysis, acquiring skills in using a variety of statistical techniques appropriate for specific problems in education. Students specializing in statistics education investigate issues related to teaching and learning statistics and gain experience in statistics instruction. QME students develop knowledge and skills that prepare them for a variety of positions, including test companies, colleges and universities, research and evaluation centers, public school systems, government agencies, and industry.

The QME track requires 33 credits; a Plan B paper; and a final oral examination.

Courses in the QME core course requirements will satisfy Ed Psych core course requirement for 3 credits of statistics and 3 credits of measurement/evaluation.

Ed Psych Core Course Requirements (12 credits)
### Statistics Course (3 credits)
Select 3 credits from the following:
- **EPSY 8251** - Statistical Methods in Education I (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)

### Measurement/Evaluation Course (3 credits)
Select 3 credits from the following:
- **EPSY 5221** - Principles of Educational and Psychological Measurement (3.0 cr)
- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **EPSY 5244** - Survey Design, Sampling, and Implementation (3.0 cr)
- **EPSY 5247** - Qualitative Methods in Educational Psychology (3.0 cr)

### Learning/Cognition Course (3 credits)
Select 3 credits from the following:
- **EPSY 5101** - Intelligence and Creativity (3.0 cr)
- **EPSY 5114** - Psychology of Student Learning (3.0 cr)
- **EPSY 5119** - Mind, Brain, and Education (3.0 cr)
- **EPSY 5116** - Education of the Gifted and Talented (3.0 cr)
- **EPSY 8112** - Mathematical Cognition (3.0 cr)
- **EPSY 8115** - Psychology of Instruction and Technology (3.0 cr)
- **EPSY 8116** - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- **EPSY 8118** - Advanced Cognitive Psychology (3.0 cr)
- **EPSY 8707** - Principles of Behavior Analysis and Learning (3.0 cr)
- **CPSY 8301** - Developmental Psychology: Cognitive Processes (4.0 cr)
- **PSY 5014** - Psychology of Human Learning and Memory (3.0 cr)
- **PSY 5015** - Cognition, Computation, and Brain (3.0 cr)
- **PSY 5054** - Psychology of Language (3.0 cr)
- **PSY 8042** - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

### Social/Personality Course (3 credits)
Select 3 credits from the following:
- **EPSY 5151** - Cooperative Learning (3.0 cr)
- **EPSY 5135** - Human Relations Workshop (4.0 cr)
- **EPSY 5157** - Social & Developmental Psychology of Education (3.0 cr)
- **EPSY 8132** - Personality Development and Socialization (3.0 cr)
- **EPSY 8157** - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
- **EPSY 8819** - Emotion & Childhood Psychopathology (3.0 cr)
- **PSY 5101H** - Honors: Personality: Current Theory and Research (3.0 cr)
- **PSY 5135** - Psychology of Individual Differences (3.0 cr)
- **PSY 5202** - Attitudes and Social Behavior (3.0 cr)
- **PSY 5204** - Psychology of Interpersonal Relationships (3.0 cr)
- **PSY 5205** - Applied Social Psychology (3.0 cr)
- **PSY 5207** - Personality and Social Behavior (3.0 cr)
- **PSY 8201** - Social Cognition (3.0 cr)
- **PSY 8202** - Close Relationships (3.0 cr)
- **PSY 8208** - Social Psychology: The Self (3.0 cr)
- **CPSY 8302** - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- **CPSY 8606** - Advanced Developmental Psychopathology (3.0 cr)
- **SOC 8721** - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

### Plan B Paper (3 credits)
Take 3 credits of the following:
- **EPSY 5991** - Independent Study in Educational Psychology (1.0 - 8.0 cr)

### QME Core Coursework (18 credits)
Take the following courses. All courses must be taken A-F.
- **EPSY 5221** - Principles of Educational and Psychological Measurement (3.0 cr)
- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **EPSY 5244** - Survey Design, Sampling, and Implementation (3.0 cr)
- **EPSY 5247** - Qualitative Methods in Educational Psychology (3.0 cr)
- **EPSY 8251** - Statistical Methods in Education I (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)

### Emphases

#### Measurement & Evaluation Emphasis (6 credits)
Select 6 credits from the following. Other courses can be applied to this requirement with advisor approval.
- **EPSY 8224** - Performance Assessment Design and Analysis (3.0 cr)
- **EPSY 8225** - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- **EPSY 8226** - Item Response Models: Theory and Applications (3.0 cr)
- **EPSY 8265** - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

-OR-

Statistics & Statistics Education Emphasis (6 credits)
Select 6 credits from the following. Other courses can be applied to this requirement with advisor approval.
EPSY 5271 - Becoming a Teacher of Statistics (3.0 cr)
EPSY 5272 - Statistics Teaching Internship (1.0 - 3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)

School Psychology
This sub-plan is limited to students completing the program under Plan B.

School psychology does not offer the MA as a terminal degree; rather, the MA is required to pursue the specialist certificate or PhD in educational psychology.

The final examination may be oral, written, or both.

EPSY Core Course Requirements (12 credits)
Statistics Course (3 credits)
Select 3 credits from the following:
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
Measurement/Evaluation Course (3 credits)
Take the following course:
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
Learning/Cognition Course (3 credits)
Select 3 credits from the following:
EPSY 5101 - Intelligence and Creativity (3.0 cr)
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 5119 - Mind, Brain, and Education (3.0 cr)
EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
EPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5054 - Psychology of Language (3.0 cr)
PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
Social/Personality Course (3 credits)
Take the following course:
EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)

Plan B Paper (3 credits)
Take the following course:
EPSY 8822 - Research in School Psychology (3.0 cr)

School Psychology Coursework (15 credits)
Select 15 credits from the following:
EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
EPSY 5802 - History & Scientific Bases of Psychology (3.0 cr)
EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
EPSY 8811 - Assessment in School Psychology I: Foundations of Academic Assessment (3.0 cr)
Special Education

The special education track aims to improve outcomes for individuals who require specialized support to experience success across the lifespan. We are committed to engaging in meaningful research to bridging research and practice to improve the lives of children and families in diverse contexts, and to have a lasting impact on teacher education, leadership, and policy. Early involvement in research projects and the development of original research addressing the needs of individuals requiring specialized support is encouraged and may include focused attention to intervention science, implementation science, social and cognitive development, behavioral and psychological management, language and communication skills, and/or the design and use of technology to promote impact.

The special education track focuses on the attainment of core competencies required for special education professionals as well as interdisciplinary skills and goals needed to address diverse challenges in diverse contexts. A complementary emphasis is placed on systematic understanding and problem solving in relation to social and cultural perceptions, care, education, intervention, and support of persons with disabilities.

Students may emphasize consulting, college teaching, or research in one or more of the specialized plans below.

Students in the ABA emphasis are required to complete 33 credits and a capstone research project. Students are required to participate in up to 20 hours per week of fieldwork experience in one of our partner sites during each of the four semesters. Students who intend to take the board certification exam must complete 1,500 hours of concentrated supervised fieldwork (or 2,000 hours if accruing under supervised fieldwork) after beginning the MA in ABA program to qualify for the exam. Many of our practicum partners provide paid supervision in paid positions.

The Plan A requires a final oral examination. The Plan B option final examination may be oral, written, or both.

**EPSY Core Course Requirements (12 credits)**

**Statistics Course (3 credits)**

Take 3 credits from the following:
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8266 - Statistical Methods in Education II (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)

**Measurement/Evaluation (3 credits)**

Select 3 credits from the Measurement list or from the Evaluation list:
- Measurement
  - EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
  - EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
  - EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
  - EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
  - EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
  - EPSY 8265 - Factor Analysis (3.0 cr)
  - PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
  - PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
- Evaluation
  - EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
  - EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
  - EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
  - OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

**Learning/Cognition Course (3 credits)**

Students pursuing the Applied Behavior Analysis emphasis must take EPSY 5659 (petition required). All other students select 3 credits from the following:
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>Mathematical Cognition</td>
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<td>EPSY 8115</td>
<td>Psychology of Instruction and Technology</td>
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<td>Developmental Psychology: Cognitive Processes</td>
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<td>PSY 8042</td>
<td>Proseminar in Cognition, Brain, and Behavior</td>
<td>3.0 cr</td>
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</tbody>
</table>

**Social/Personality Course (3 credits)**

Select 3 credits from the following:

- EPSY 5135 - Human Relations Workshop
- EPSY 5151 - Cooperative Learning
- EPSY 5157 - Social & Developmental Psychology of Education
- EPSY 8132 - Personality Development and Socialization
- EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education
- EPSY 8819 - Emotion & Childhood Psychopathology
- PSY 5101H - Honors: Personality: Current Theory and Research
- PSY 5135 - Psychology of Individual Differences
- PSY 5202 - Attitudes and Social Behavior
- PSY 5204 - Psychology of Interpersonal Relationships
- PSY 5205 - Applied Social Psychology
- PSY 5207 - Personality and Social Behavior
- PSY 8201 - Social Cognition
- PSY 8202 - Close Relationships
- PSY 8208 - Social Psychology: The Self
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes
- CPSY 8606 - Advanced Developmental Psychopathology
- SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities

**Plan A Requirements**

**Electives (9 credits)**

Select 9 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.

- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs
- EPSY 5605W - Collaborative Practices for the Special Educator [WI]
- EPSY 5614W - Assessment and Due Process in Special Education [WI]
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI]
- EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention
- EPSY 5641 - Foundations of Deaf Education
- EPSY 5642 - Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing
- EPSY 5643 - Seminar: Identity, Culture and Diversity in Deaf Education
- EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing
- EPSY 5645 - Deaf Plus: Educating and Understanding Deaf Students with Disabilities
- EPSY 5646 - Best Practices Teaching Reading and Writing for School Age: Deaf and Hard of Hearing
- EPSY 5647 - Spoken Language Practices and Assistive Technology: Deaf and Hard of Hearing
- EPSY 5651 - Best Practices Teaching Content Areas: Deaf Education
- EPSY 5652 - Incorporating Academic ASL in the Classroom: Deaf and Hard of Hearing
- EPSY 5657 - Interventions for Behavioral Problems in School Settings
- EPSY 5661 - Introduction to Autism Spectrum Disorder
- EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder
- EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions
- CI 5645 - Teaching English Learners in English-medium Classrooms
- MTHE 5355 - Mathematics for Diverse Learners

**Thesis Credits (10 credits)**

Take 10 master's thesis credits.

- EPSY 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B Requirements**

**Electives (12 credits)**

Plan B students not pursuing the Applied Behavior Analysis Emphasis select 12 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor approval.
EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
EPSY 5641 - Foundations of Deaf Education (3.0 cr)
EPSY 5642 - Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing (3.0 cr)
EPSY 5643 - Seminar: Identity, Culture and Diversity in Deaf Education (2.0 cr)
EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing (3.0 cr)
EPSY 5645 - Deaf Plus: Educating and Understanding Deaf Students with Disabilities (2.0 cr)
EPSY 5646 - Best Practices Teaching Reading and Writing for School Age: Deaf and Hard of Hearing (3.0 cr)
EPSY 5647 - Spoken Language Practices and Assistive Technology: Deaf and Hard of Hearing (2.0 cr)
EPSY 5651 - Best Practices Teaching Content Areas: Deaf Education (3.0 cr)
EPSY 5652 - Incorporating Academic ASL in the Classroom: Deaf and Hard of Hearing (3.0 cr)
EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder (3.0 cr)
EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions (3.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Research Problems (6 credits)
Take 6 credits of the following:
EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)

Applied Behavior Analysis Emphasis
The Applied Behavior Analysis emphasis is for Plan B students only.

Required Courses (17 credits)
Take 17 credits from the following:
EPSY 5623 - Ethics in Applied Behavior Analysis (3.0 cr)
EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder (3.0 cr)
EPSY 5702 - Applied Behavior Analysis: Supervision Seminar I (1.0 cr)
EPSY 5703 - Applied Behavior Analysis: Supervision Seminar II (1.0 cr)
EPSY 8706 - Single Case Designs in Intervention Research (3.0 cr)
EPSY 8708 - Functional Behavior Assessment (3.0 cr)
or EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)

Research Problems (4 credits)
Take 4 credits of the following:
EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)
Twin Cities Campus
Educational Psychology Minor
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: 1) counselor education; 2) school psychology; 3) special education; 4) psychological foundations of education (learning and cognition/educational technology, social psychological and social development processes in educational psychology including human relations); and 5) quantitative methods in education (including measurement & evaluation and statistics & statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires at least 6 credits of graduate-level EPSY courses. A doctoral minor requires at least 12 credits of graduate-level EPSY courses, of which at least 9 credits must be in 8xxx courses. Course selection is determined in consultation with the educational psychology committee member. Courses must be taken on an A-F grade basis with a minimum grade of B in all coursework for the minor. Students will not be able to substitute courses taken outside of Educational Psychology (EPSY).

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
A master's minor requires at least 6 credits of graduate-level EPSY courses. Course selection is determined in consultation with the educational psychology committee member. Courses must be taken on an A-F grade basis with a minimum grade of B in all coursework for the minor.

Doctoral
A doctoral minor requires at least 12 credits of graduate-level EPSY courses, of which at least 9 credits must be in 8xxx courses. Course selection is determined in consultation with the educational psychology committee member. Courses must be taken on an A-F grade basis with a minimum grade of B in all coursework for the minor.
**Twin Cities Campus**

Educational Psychology Ph.D.

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

**Contact Information:**
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: epsy-adm@umn.edu
Website: [http://www.cehd.umn.edu/edpsych](http://www.cehd.umn.edu/edpsych)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66 to 97
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has four tracks: school psychology; special education; psychological foundations of education (with emphases in learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (with emphases in measurement/evaluation and statistics/statistics education).

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

**Special Application Requirements:**
Applicants must apply online submitting a department application, three letters of recommendation, and a personal statement of goals and interests. Applications should be accompanied by official transcripts from all colleges and universities attended. The personal statement for school psychology applicants must be two-pages following program guidelines specified on website. School Psychology applicants must also submit a one-page critical issue essay, answering the following questions: What is the role of a school psychologist? What are the most critical educational issues school psychologists can help address? How would you like to contribute to addressing these issues in your future career? An interview is required for those who make the initial cut in school psychology.

Applications are accepted for fall admission only. Application deadlines are November 15 for the school psychology track; December 1 for the psychological foundations, quantitative methods and special education tracks; March 1 as a second deadline for quantitative methods. To be considered for fellowship nominations, applications must be submitted by the November 15 (school psychology) or December 1 deadlines.

Due to the various impacts of the COVID-19 global pandemic, the psychological foundations and special education tracks will not require the GRE in the application for admissions for fall 2022.

The quantitative methods track does require the GRE in the application for admissions.

The school psychology track does not require the GRE in the application for admissions.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of November 07, 2022
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

42 to 73 credits are required in the major.
0 to 9 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete credits in EPSY core courses (6 credits in statistics, 3 credits in measurement/evaluation, 6 credits in research methods, 9 credits from at least two areas: learning/cognition, social/personality, history/systems), 9 credits EPSY electives and 24 thesis credits. Further required credits are detailed within subplan requirements.

Courses must be taken A-F unless only offered S/N.

Students must hold a prospectus meeting for their dissertation the semester following the preliminary oral exam. The thesis planning panel will review and approve the prospectus and the student must submit the Thesis Planning Panel form to the department's graduate studies office.

**Thesis Credits**

Take at least 24 doctoral thesis credits.

**EPSY 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Psychological Foundations of Education**

Graduate study in psychological foundations of education prepares students for research and teaching positions in colleges and universities. Students have also gone on to positions in professional settings such as schools, private industry, human service organizations, health science units, and government agencies. The goal of the track is to apply and generate knowledge of psychological processes and methodological procedures involved in learning and teaching.

The psychological foundations track offers emphases in learning and cognition/educational technology or social psychological and social developmental (including human relations) processes in educational psychology. Students typically choose one of these areas in addition to achieving broad competence in all aspects of the curriculum.

Students take 72 credits distributed as follows: 24 credits EPSY core requirements, 9 credits EPSY electives, 18 credits in the area of emphasis in PsyF (12 PSYF credits can be used to satisfy EPSY core and elective requirements), 9 credits of coursework outside of ed psych, and 24 thesis credits.

**Ed Psych Core Course Requirements**

Psychological foundations students must take 3 credits in history/systems, 3 credits in learning/cognition, 3 credits in social/personality, 6 credits in research methods, 6 credits in statistics, 3 credits in measurement/evaluation, and 9 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

**History/Systems (3 credits)**

PsyF students must take EPSY 8905.

**EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)**

**Learning/Cognition (3 credits)**

Students in the learning area of PsyF can satisfy this requirement with required learning emphasis courses from the list below. Students in the social area of PsyF must take one of the following courses: EPSY 5101, 5113, 5114, 5116, or 5119.

**EPSY 5101 - Intelligence and Creativity (3.0 cr)**

**EPSY 5114 - Psychology of Student Learning (3.0 cr)**
EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
EPSY 5119 - Mind, Brain, and Education (3.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)

Social/Personality (3 credits)
Students in the social area of PsyF can satisfy this requirement with required social emphasis courses from the list below. Students in the learning area of PsyF must take one of the following courses: EPSY 5151, 5157, or 8157.
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- EPSY 5151 - Cooperative Learning (3.0 cr)
- EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
- EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)

Research Methods (6 credits)
- EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
- EPSY 8216 - Seminar: Research Processes in Psychological Foundations of Education (3.0 cr)

Statistics (6 credits)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Measurement/Evaluation (3 credits)
Take 3 credits from the following list:
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

EPSY Electives
9 credits of EPSY electives can be satisfied by additional courses in the area of emphasis.

External Courses (9 credits)
Psych foundations students must take a minimum of 9 credits of coursework outside of educational psychology in consultation with advisor.

Psychological Foundations Emphases
Students must take additional courses in their area of emphasis in consultation with advisor. EPSY courses will satisfy 3 credits ed psych learning or social core requirement and 9 credits EPSY electives.

Learning/Cognition Emphasis

Required Learning and Cognition Courses (6 credits)
Take 6 credits from the following list:
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)

Specialization Courses in Learning and Cognition (12 credits)
Select at least 12 credits from the following in consultation with advisor. Substitute courses can be applied to this requirement with advisor approval.
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
- EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
- EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
- EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
- EPSY 8290 - Special Topics: Seminar in Psychological Foundations (1.0 - 6.0 cr)

-OR-

Social Emphasis
Required Social Psychology or Social Development Courses (6 credits)
Take 6 credits from the following list:
EPSY 5151 - Cooperative Learning (3.0 cr)
EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
PSY 5135 - Psychology of Individual Differences (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 5205 - Applied Social Psychology (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)

**Specialization Courses in Social Psychology or Social Development (12 credits)**
Select at least 12 credits from the following in consultation with advisor. Substitute courses can be applied to this requirement with advisor approval.

- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
- EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
- EPSY 8290 - Special Topics: Seminar in Psychological Foundations (1.0 - 6.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8202 - Close Relationships (3.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)

**Quantitative Methods in Education**
In QME students explore methodologies of measurement/evaluation, and statistics/statistics education to improve our understanding and use of these methods as well as explore new approaches to address educational phenomena. Students specializing in measurement study psychometric theories and methods of developing, selecting, and using measures of knowledge, skills, abilities, and non-cognitive variables. This includes item writing, test design, equating, scaling, and standard setting, techniques supporting decision making and accountability. Students specializing in evaluation study theories and models of evaluation that include quantitative and qualitative techniques for evaluating the effectiveness of educational and human services programs. Students specializing in statistics study a wide range of statistical methods, as well as their underlying statistical theories, and develop an understanding of the relationship between research design and statistical analysis, acquiring skills in using a variety of statistical techniques appropriate for specific problems in education. Students specializing in statistics education investigate issues related to teaching and learning statistics and gain experience in statistics instruction. QME students develop knowledge and skills that prepare them for a variety of positions, including test companies, colleges and universities, research and evaluation centers, public school systems, government agencies, and industry.

Students take 72 credits distributed as follows: 27 credits EPSY core requirements, 9 credits EPSY electives, 18 credits QME core requirements, 12 additional credits in the area of emphasis in QME (18 QME credits can be used to satisfy EPSY core and elective requirements), and 24 thesis credits.

**Ed Psych Core Course Requirements**
Students must take 9 credits in at least two of these areas: learning/cognition, social/personality or history/systems; and 9 credits in research methods. (QME core courses will satisfy EPSY core requirements for 6 credits in statistics and 3 credits in measurement/evaluation; 9 credits in EPSY electives can be satisfied by additional courses in the area of emphasis.) Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

**Learning/Cognition, Social/Personality, History/Systems (9 credits)**
Take 9 or more credit(s) including 2 or more sub-requirements(s) from the following:

- **learning/cognition**
  - CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
  - EPSY 5101 - Intelligence and Creativity (3.0 cr)
  - EPSY 5114 - Psychology of Student Learning (3.0 cr)
  - EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
  - EPSY 5119 - Mind, Brain, and Education (3.0 cr)
  - EPSY 8112 - Mathematical Cognition (3.0 cr)
  - EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
  - EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
  - EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
  - EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
  - PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
  - PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
  - PSY 5054 - Psychology of Language (3.0 cr)
  - PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

- **social/personality**
  - CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
  - CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
  - EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
• EPSY 8132 - Personality Development and Socialization (3.0 cr)
• EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
• EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
• EPSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)
• history/systems

Take 0 or more course(s) from the following:
• EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

Research Methods (9 credits)
QME students must take these 3 research methods courses.
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

Statistics
6 credits of statistics will be satisfied by QME core course requirements.
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Measurement/Evaluation
3 credits of measurement or evaluation will be satisfied by QME core course requirements.
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
or EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)

EPSY Electives
9 credits of EPSY electives can be satisfied by additional QME core courses and courses in the area of emphasis.

QME Core Course Requirements (18 credits)
Students must take these courses, including an 8xxx level measurement course selected in consultation with advisor (minimum 18
credits total). Courses taken to satisfy QME core requirements must be taken on an A-F grade basis.
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8xxx measurement course (minimum 3 credits)

QME Emphases
Students must take a minimum of 12 credits in their area of emphasis in consultation with advisor. EPSY courses will satisfy 9 credits
ed psych elective core requirement.

Measurement & Evaluation Emphasis (12 credits)
Courses can be from the following list or selected in consultation with the advisor.
EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)

-OR-

Statistics & Statistics Education Emphasis (12 credits)
Courses can be from the following list or selected in consultation with the advisor.
School Psychology

The school psychology PhD program is fully accredited by the American Psychological Association, and the Minnesota Board of Teaching, and approved by the National Association of School Psychologists. Through coursework and practica/internships, students develop competencies in research, assessment, consultation, prevention and intervention, supervision, and higher education instruction. Graduates are employed as faculty and researchers in universities, and as psychologists in K12 schools, clinics, hospitals, and mental health centers, or as researchers in a variety of settings. Graduates are eligible for the state school psychologist credential, national certification in school psychology, and most states license to practice professional psychology. Students graduate preparation focuses on the knowledge and skills necessary to develop, implement, and disseminate high quality research and to engage in provision of research-based school psychological practices within multi-tier systems of support to improve academic, social, behavioral, and emotional competence of children and youth. Students develop specific competencies through a broad range of didactic courses, research activities, teaching and supervisory experience, and field placements, including practica and a full-year internship.

Students take 97 credits distributed as follows: 24 credits EPSY core requirements, 9 credits EPSY electives, 49 credits School Psychology required courses (9 credits can be used to satisfy EPSY elective requirement), and 24 thesis credits.

Ed Psych Core Course Requirements

Students must take 9 credits in at least two of these areas: learning/cognition, social/personality or history/systems; 6 credits in research methods; 6 credits in statistics; 3 credits in measurement/evaluation and 9 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Learning/Cognition, Social/Personality, History/Systems (9 credits)

Take 9 or more credit(s) including 2 or more sub-requirement(s) from the following:

learning/cognition

Take 0 or more course(s) from the following:
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
- EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5054 - Psychology of Language (3.0 cr)
- PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

social/personality

School Psychology students must take EPSY 8819

Take 1 or more course(s) from the following:
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
- EPSY 5135 - Human Relations Workshop (4.0 cr)
- EPSY 5151 - Cooperative Learning (3.0 cr)
- EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
- EPSY 5132 - Personality Development and Socialization (3.0 cr)
- EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
- EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
- PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
- PSY 5135 - Psychology of Individual Differences (3.0 cr)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

• history/systems
Take 0 or more course(s) from the following:
• EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

Statistics (6 credits)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8269 - Statistical Analysis of Longitudinal Data (3.0 cr)

Measurement/Evaluation (3 credits)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)

Research Methods (6 credits)
6 credits required
EPSY 8822 - Research in School Psychology (3.0 cr)
Take 3 or more credit(s) from the following:
• EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

EPSY Electives
9 credits of EPSY electives can be satisfied by school psychology course requirements.

School Psychology Course Requirements (27 credits)
Take the following courses. EPSY courses will satisfy 9 credits ed psych elective core requirement.
EPSY 5802 - History & Scientific Bases of Psychology (3.0 cr)
EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
EPSY 8811 - Assessment in School Psychology I: Foundations of Academic Assessment (3.0 cr)
EPSY 8812 - Assessment in School Psychology II: Intellectual and Social-Emotional Domains (3.0 cr)
EPSY 8815 - Behavioral and Social Emotional Prevention and Intervention (3.0 cr)
EPSY 8816 - Academic Prevention and Intervention (3.0 cr)
EPSY 8817 - Problem Analysis and Consultation in School Psychology (3.0 cr)
EPSY 8821 - Issues in School Psychology (3.0 cr)
EPSY 8823 - Ethics and Professional Standards in School Psychology (3.0 cr)

Introductory Practicum (4 credits)
Students must take EPSY 8813 twice.
EPSY 8813 - Introductory Practicum in School Psychology (2.0 cr)

Intermediate Practicum (4 credits)
Students must take EPSY 8818 twice.
EPSY 8818 - Intermediate Practicum in School Psychology (2.0 cr)

Comprehensive/Advanced Practica (6 credits)
EPSY 8831 - Comprehensive School Practicum in School Psychology (3.0 cr)
EPSY 8832 - Advanced Practicum in School Psychology (3.0 cr)

Practicum: Instruction and Supervision in School Psychology (6 credits)
Students must take EPSY 8841 twice.
EPSY 8841 - Practicum: Instruction and Supervision in School Psychology (3.0 cr)

Internship (2 credits)
Students must register for internship both fall and spring semesters of the internship year (1 credit each term). There are two options for internship registration:
* Students register for EPSY 8843 after defending their dissertation
* Students register for EPSY 8842 if the dissertation defense has not been completed
EPSY 8843 - Internship - School Psychology (1.0 cr)
EPSY 8842 - Internship: School Psychological Services (1.0 - 10.0 cr)

Special Education
The special education program aims to improve outcomes for individuals who require specialized support to experience success across the lifespan. We are committed to engaging in meaningful research and bridging research and practice, improve the lives of children and families in diverse contexts, and to have a lasting impact on teacher education, leadership, and policy. Early involvement in research projects and the development of original research addressing the needs of individuals requiring specialized support is encouraged and may include focused attention to intervention science, implementation science, social and cognitive development, behavioral and psychological management, language and communication skills, and/or the design and use of technology to promote impact. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities as well as federal, state, and local legislation regarding prevention, care and education of persons with

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Information current as of November 07, 2022
disabilities. Special projects and training programs supplement academic studies.

The special education track focuses on the attainment of core competencies and related skills, such as systematic problem solving, empirical design, data analytics, and measurement.

Students take 66 credits distributed as follows: 24 credits EPSY core requirements, 9 credits EPSY electives, 18 credits special ed course requirements (9 credits can be used to satisfy EPSY elective requirement), and 24 thesis credits.

**Ed Psych Core Course Requirements**

Students must take 9 credits in at least two of these areas: learning/cognition, social/personality or history/systems; 6 credits in research methods; 6 credits in statistics; 3 credits in measurement/evaluation and 9 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

**Learning/Cognition, Social/Personality, History/Systems (9 credits)**

Take 9 or more credit(s) including 2 or more sub-requirements(s) from the following:

**learning/cognition**

Take 0 or more course(s) from the following:

- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
- EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
- EPSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- EPSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- EPSY 5054 - Psychology of Language (3.0 cr)
- EPSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

**social/personality**

Take 0 or more course(s) from the following:

- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
- EPSY 5135 - Human Relations Workshop (4.0 cr)
- EPSY 5151 - Cooperative Learning (3.0 cr)
- EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
- EPSY 8132 - Personality Development and Socialization (3.0 cr)
- EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
- EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
- PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
- PSY 5135 - Psychology of Individual Differences (3.0 cr)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8202 - Close Relationships (3.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)
- SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

**history/systems**

Take 0 or more course(s) from the following:

- EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

**Research Methods (6 credits)**

EPSY 8694 - Research in Special Education (3.0 cr)
EPSY 8706 - Single Case Designs in Intervention Research (3.0 cr)

**Statistics (6 credits)**

EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Measurement/Evaluation (3 credits)**

Take 3 credits from the following.

- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)

EPSY Electives
9 credits of EPSY electives can be satisfied by special ed course requirements.

Special Ed Course Requirements
Students take 9 required special education credits and 9 elective credits in consultation with the advisor. EPSY courses will satisfy 9 credits ed psych elective core requirement.

Doctoral Core Seminars (6 credits)
EPSY 8701 - Doctoral Core Seminar: Special Education I (3.0 cr)
EPSY 8702 - Doctoral Core Seminar: Special Education II (3.0 cr)

Grant Writing Course (3 credits)
EDHD 8300 - Special Topics in Education and Human Development: Grant Writing - Behav, Social, and Educ Sciences (3 cr.)

Electives (9 credits)
In consultation with their advisor, students take 9 credits of electives to develop focused expertise. Possible courses include, but are in no way limited to the following. Courses taken to satisfy Ed Psych Core Course Requirements cannot be used to satisfy special ed elective requirement credits.

Recommended Special Topics/Advanced Issues
EPSY 8602 - Advanced Topics in Special Education Research (3.0 cr)
EPSY 8612 - Seminar: Students with Academic Difficulties (3.0 cr)
EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
EPSY 8708 - Functional Behavior Assessment (3.0 cr)
EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)

Learning/Cognition
CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)

Social/Personality
CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8202 - Close Relationships (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

Measurement/Statistics/Evaluation
EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)

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Information current as of November 07, 2022
Twin Cities Campus
Educational Psychology Specialist Certificate in Education and School Psychological Services
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: spsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SchoolPsych/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Sch Psych Svc

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students graduate preparation focuses on the knowledge and skills necessary to engage in provision of research-based school psychological practices within multi-tier systems of support to improve academic, social, behavioral, and emotional competence of children and youth, as well as to develop, implement, and use applied research in school settings. Students develop specific competencies through a broad range of didactic courses, research activities, and field placements, including practica and a full-year internship. The specialist certificate is designed for students who want to become practitioners. The school psychology specialist certificate is approved by the Minnesota Board of Teaching and the National Association of School Psychologists. Graduates are eligible for the Minnesota school psychologist credential, and the national certification in school psychology, as well as the school psychology credential in most states.

Accreditation
This program is accredited by National Association of School Psychologists (NASP).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, resume or curriculum vita, three letters of recommendation, and a two page personal statement following program guidelines specified on website. Applicants must also submit a one page critical issue essay, answering the following questions: What is the role of a school psychologist? What are the most critical educational issues school psychologists can help address? How would you like to contribute to addressing these issues in your future career?

Applications should be accompanied by official transcripts from all colleges and universities attended. An interview is also required for those who make the initial cut.

Applications are accepted for fall admission only (deadline November 15).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students take 60 credits distributed as follows: 15 credits EPSY core courses, 6 credits EPSY electives, and 45 credits school psychology course requirements (6 credits can satisfy EPSY elective requirement). There is a written final exam.

**Ed Psych Core Course Requirements**

Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits learning/cognition, 3 credits social/personality, 3 credits in research methods and 6 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

**Statistics (3 credits)**

Select one of the following courses.
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)

**Measurement/Evaluation (3 credits)**

- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)

**Learning/Cognition (3 credits)**

Select one of the following courses. School Psychology students in the Specialist Certificate program may submit a petition for EPSY 5659.
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
- EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
- EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5054 - Psychology of Language (3.0 cr)
- PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

**Social/Personality (3 credits)**

- EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)

**Research Methods (3 credits)**

Select one of the following courses.
- EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
- EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

**EPSY Electives**

6 credits of EPSY electives can be satisfied by school psychology course requirements.

**School Psychology Course Requirements**

Students must take 36 credits required courses, 3 credits research problems and 6 credits electives.

**Introductory Practicum (4 credits)**

Students must take EPSY 8813 twice.
- EPSY 8813 - Introductory Practicum in School Psychology (2.0 cr)

**Intermediate Practicum (4 credits)**

Students must take EPSY 8818 twice.
- EPSY 8818 - Intermediate Practicum in School Psychology (2.0 cr)

**Internship (4 credits)**

Students must take EPSY 8842 twice for 4 credits total. Note: if additional electives are taken students may enroll in one credit per semester of internship, as long as the total number of credits accrued while in the program is at least 60.
- EPSY 8842 - Internship: School Psychological Services (1.0 - 10.0 cr)
### Additional Required Courses (24 credits)
EPSY courses will satisfy 6 credits educational psychology elective core requirement.

- **EPSY 5851** - Engaging Diverse Students and Families (3.0 cr)
- **EPSY 8811** - Assessment in School Psychology I: Foundations of Academic Assessment (3.0 cr)
- **EPSY 8812** - Assessment in School Psychology II: Intellectual and Social-Emotional Domains (3.0 cr)
- **EPSY 8815** - Behavioral and Social Emotional Prevention and Intervention (3.0 cr)
- **EPSY 8816** - Academic Prevention and Intervention (3.0 cr)
- **EPSY 8817** - Problem Analysis and Consultation in School Psychology (3.0 cr)
- **EPSY 8821** - Issues in School Psychology (3.0 cr)
- **EPSY 8823** - Ethics and Professional Standards in School Psychology (3.0 cr)

### Research Problems (3 credits)
- **EPSY 8822** - Research in School Psychology (3.0 cr)

### Electives (6 credits)
Courses can be from the following list or selected in consultation with the advisor.

- **EPSY 5605W** - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- **EPSY 5616W** - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- **EPSY 5638** - Core Practices in Special Education: IEP Writing (1.0 cr)
- **EPSY 5657** - Interventions for Behavioral Problems in School Settings (3.0 cr)
- **EPSY 5802** - History & Scientific Bases of Psychology (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)
- **EPSY 8706** - Single Case Designs in Intervention Research (3.0 cr)
- **EPSY 8708** - Functional Behavior Assessment (3.0 cr)
- **EPSY 8850** - Doctoral Seminar in School Psychology: Research, Training, Practice, Policy Issues, and Action Plans (3.0 cr)
- **CPSY 8302** - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- **FSOS 5937** - Parent-Child Interaction (3.0 cr)
- **PREV 8003** - New Topics in Prevention: Implementation and Dissemination (3.0 cr)
Twin Cities Campus
Educational Psychology Specialist Certificate in Education and Special Education
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241).
Email: epsy.adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Spec Educ

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The special education track aims to improve outcomes for individuals who require specialized support to experience success across the lifespan. We are committed to engaging in meaningful research and to bridging research and practice to improve the lives of children and families in diverse contexts, and to have a lasting impact on teacher education, leadership, and policy. Early involvement in research projects and the development of original research addressing the needs of individuals requiring specialized support is encouraged and may include focused attention to intervention science, implementation science, social and cognitive development, behavioral and psychological management, language and communication skills, and/or the design and use of technology to promote impact.

The special education track focuses on the attainment of core competencies required for special education professionals as well as interdisciplinary skills and goals needed to address diverse challenges in diverse contexts. A complementary emphasis is placed on systematic understanding and problem solving in relation to social and cultural perceptions, care, education, intervention, and support of persons with disabilities.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admission to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. Applications are accepted for fall admission only (deadline December 1).

Applications should be accompanied by official transcripts from all colleges and universities attended.

Due to the various impacts of the COVID-19 global pandemic, the GRE will not be required in the application for admissions for fall 2022.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students take 60 credits distributed as follows: 15 credits EPSY core courses, 6 credits EPSY electives and 45 credits of coursework in special education (6 credits can satisfy EPSY elective requirement).

Ed Psych Core Course Requirements
Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits learning/cognition, 3 credits social/personality, 3 credits in research methods and 6 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Statistics (3 credits)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)

Measurement/Evaluation (3 credits)
Select one of the following courses from measurement or evaluation.

measurement
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)

or evaluation
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Learning/Cognition (3 credits)
Select one of the following courses.

CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
EPSY 5101 - Intelligence and Creativity (3.0 cr)
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
EPSY 5119 - Mind, Brain, and Education (3.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5054 - Psychology of Language (3.0 cr)
PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

Social/Personality (3 credits)
Select one of the following courses.

CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
EPSY 5135 - Human Relations Workshop (4.0 cr)
EPSY 5151 - Cooperative Learning (3.0 cr)
EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
EPSY 8132 - Personality Development and Socialization (3.0 cr)
EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
PSY 5135 - Psychology of Individual Differences (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 5205 - Applied Social Psychology (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8202 - Close Relationships (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

Research Methods (3 credits)
EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

EPSY Electives
6 credits of EPSY electives can be satisfied by special education course requirements.

Special Education Course Requirements
EPSY courses will satisfy 6 credits Ed Psych elective core requirement.

Special Topic/Issues Courses (9 credits)
EDHD 8300 - Special Topics in Education and Human Development: Grant Writing - Behav, Social, and Educ Sciences (3 cr.)
EPSY 8600 Special Topic course or other EPSY 8xxx level course chosen in consultation with advisor (3 cr.)
EPSY 8600 Special Topic course or other EPSY 8xxx level course chosen in consultation with advisor (3 cr.)

Doctoral Core Seminars (6 credits)
EPSY 8701 - Doctoral Core Seminar: Special Education I (3.0 cr)
EPSY 8702 - Doctoral Core Seminar: Special Education II (3.0 cr)

Special Ed Research Related Courses (6 credits)
EPSY 8604 - Research in Special Education (3.0 cr)
EPSY 8706 - Single Case Designs in Intervention Research (3.0 cr)

Specialist Project (9 credits)
Select at least 9 credits from the following in consultation with advisor.
EPSY 8993 - Directed Study: Educational Psychology (1.0 - 10.0 cr)
EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)

Electives (15 credits)
In consultation with their advisor, students take 15 credits of electives to develop focused expertise. Possible courses include, but are in no way limited to the following. Courses taken to satisfy Ed Psych Core Course Requirements cannot be used to satisfy special ed elective requirement credits.

Recommended Advanced Issues Courses
EPSY 8602 - Advanced Topics in Special Education Research (3.0 cr)
EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
EPSY 8708 - Functional Behavior Assessment (3.0 cr)

Learning/Cognition
EPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)

Social/Personality
EPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
EPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8202 - Close Relationships (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

Measurement/Evaluation/Statistics
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)

Other
EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
Twin Cities Campus
Family Education M.Ed.
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Ave, St. Paul, MN 55108 (612-625-2705; fax: 612-625-4227)
Email: famed@umn.edu
Website: http://www.cehd.umn.edu/fsos/programs/index.html

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Family Education MEd develops and strengthens professionals' competencies to work with individuals and families to enhance family life. This practitioner-based program, offered by the Department of Family Social Science (FSoS), prepares licensed teachers to further develop their knowledge and skills in the family education field, or non-licensed professionals to work with adults, youth, or children in a variety of settings. Students are prepared to be parent educators for positions in an early childhood family education (ECFE) program in Minnesota, as well as for family education positions in a variety of settings including health care, social service agencies, and religious settings in Minnesota and in other states and countries. Diversity and cultural responsiveness are integrated throughout coursework, student teaching, and observation experiences.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
A bachelor's degree from an accredited institution in family studies, child psychology, early childhood education, nutrition, or related fields. A 2.80 overall GPA in undergraduate work.

Special Application Requirements:
Application deadlines are March 1 and October 1. Apply Online at https://choose.umn.edu/apply/

For program specific application details see http://www.cehd.umn.edu/fsos/programs/masters/family-ed/how-to-apply.html

International Students: Please note, this program is not offered full-time and therefore is not intended for international students needing a visa to study in the US.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Coursework (15 credits)
Take the following courses:
- FSOS 5937 - Parent-Child Interaction (3.0 cr)
- FSOS 5942 - Diverse Family Experiences (3.0 cr)
- FSOS 5944 - Curricular Design in Parent Education (3.0 cr)
- FSOS 5945 - Teaching and Learning in Parent Education (3.0 cr)
- FSOS 5946 - Assessment and Evaluation in Parent Education (3.0 cr)

Supporting Focus (15 credits)
Fifteen credits selected from existing UMN courses in consultation with students academic adviser to create a supporting focus which will support development of career goals. Examples may include courses in family social science, child development, education, public health, addiction studies, policy development, program evaluation, prevention science, etc.

Classroom Experience
Professionals seeking additional classroom experience are recommended to take the following course:
- FSOS 5949 - Student Teaching in Parent Education (3.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Parent Education Teaching License
Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

The University of Minnesota does not award licensure. The Professional Educator Licensing and Standards Board (PELSB) determines licensure for the state of Minnesota in the areas of teacher education and related services.
Twin Cities Campus
Family Social Science M.A.
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/

- Program Type: Master’s
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Family Social Science offers a unique program of study using the insights and methods of the social sciences to examine how families work within various contexts and cultures.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Three overall criteria guide admissions decisions: 1) evidence of strong academic preparation and the ability and desire to perform graduate level scholarship, including research; 2) fit of the applicant's professional goals with family social science (FSoS) faculty scholarship and with the overall FSoS mission, that is, enhancing the well-being of diverse families in a changing world; and 3) unique contributions applicant would make to FSoS values, including social relevance, collaboration, inclusiveness, excellence, innovation, and diversity. The Prevention Science sub-plan is not accepting applications at this time.

Special Application Requirements:
For more information about application requirements and procedures, consult the Family Social Science web page at http://www.cehd.umn.edu/fsos/.

The Prevention Science sub-plan is not accepting applications at this time.

Applicants for the master's program are reviewed only once per year. The application deadline is March 1 for admission for the following fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

**Plan A:** Plan A requires 14 to 19 major credits, 3 to 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 19 to 23 major credits and 3 to 7 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students must demonstrate familiarity with the tools of research or scholarship in the field of family social science or prevention science, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project.

The project should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The graduate faculty specifies both the nature and extent of the options available to satisfy this requirement, and whether the requirement is to be satisfied in conjunction with, or independent of, the courses in the student’s program.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.50 is required for students to remain in good standing.

The MA program is offered under Plan A and Plan B. The Plan A master’s is recommended for students who intend to pursue a PhD degree. The Plan B master’s is for students who wish to further their education so that they may hold positions of responsibility serving families. Although the instruction is based on research, the Plan B degree is not intended to provide intensive research training. The Plan B program is understood to be a terminal degree and is not recommended for students who intend to pursue the PhD degree. Consult the department for the most current information.

**Plan A**
Plan A requires at least 30 credits, including at least 20 course credits, of which 6 credits are outside the department in a related field, and 10 thesis credits.

- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- FSOS 8200 - Orientation for Family Social Science (1.0 cr)
- FSOS Elective
  - One FSOS course (3.0 cr)
  - or One PREV course (3.0 cr)

**Statistical Methods**
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Thesis Credits**
- Take 10 or more credit(s) from the following:
  - •FSOS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B**
Plan B requires at least 30 credits, including at least 26 course credits, of which 3 credits are outside the department in a related field, and at least 4 credits for a Plan B project.

- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8200 - Orientation for Family Social Science (1.0 cr)

One of the following research methods course(s).

- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- or Evaluation research methods course (3.0 cr)

**Electives**
- FSOS/PREV courses (12-13 cr)
- FSOS Elective
- or PREV Elective

**Statistical Methods**
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
or EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
or One course outside FSOS (3.0 cr)

Family Science Plan B Project
Take exactly 1 course(s) totaling exactly 4 credit(s) from the following:

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Prevention Science
This sub-plan is limited to students completing the program under Plan A or Plan B.

Understanding & Using What Works:
How can communities support families that have experienced trauma? What are the root causes of addictive behavior? And what strategies work best to promote the wellbeing of children and families?

Prevention Science equips students, scholars, and professionals across a range of fields to answer these questions and confront many of the daunting challenges facing today's families and communities. The Master's in Prevention Science is grounded in the belief that our greatest hope for improving the lives of children and families is comprehensive, multi-disciplinary training and education that bridges research and practice.

The Prevention Science Plan A requires at least 32 credits, including at least 22 course credits of which 3 credits are outside the department in a related field, and 10 thesis credits.

The Prevention Science sub-plan is not accepting applications at this time.

Plan A
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- FSOS 5701 - Prevention Science: Principles and Practices (3.0 cr)
  or PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
- FSOS 5702 - Prevention Science Research Methodology (3.0 cr)
  or PREV 8002 - Prevention Science Research Methodology (3.0 cr)
- FSOS 5703 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)
  or PREV 8003 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)

Take 1 or more course(s) totaling exactly 3 credit(s) from the following:
- FSOS 8193 - Directed Study in Family Social Science (1.0 - 6.0 cr)

Thesis Credits
Take 1 or more course(s) totaling exactly 10 credit(s) from the following:
- FSOS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- FSOS 5701 - Prevention Science: Principles and Practices (3.0 cr)
  or PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
- FSOS 5702 - Prevention Science Research Methodology (3.0 cr)
  or PREV 8002 - Prevention Science Research Methodology (3.0 cr)
- FSOS 5703 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)
  or PREV 8003 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)

Independent Study in Prevention Science
Take 1 or more course(s) totaling exactly 3 credit(s) from the following:
- FSOS 8193 - Directed Study in Family Social Science (1.0 - 6.0 cr)

Electives
Four additional credits of elective courses from student's area of concentration.

Plan B Project
Take 1 or more course(s) totaling exactly 4 credit(s) from the following:
- FSOS 8755 - Master's Paper: Plan B Project (1.0 - 6.0 cr)
Twin Cities Campus
Family Social Science Minor
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-
4227).
Email: fsosgrad@umn.edu
Website: https://www.cehd.umn.edu/fsos/programs/grad-minor.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for
requirements that apply to all major fields.

The program of study for the family social science graduate minor uses methods of social science to examine family systems and their
interactions with various environments. The curriculum supports study in core family social science coursework including family
theories, family research methods, and core family content.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the
catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Master's students must complete at least 6 credits of 5xxx or 8xxx coursework in family social science.

Doctoral students must complete at least 12 credits of 5xxx or 8xxx coursework in family social science.

All courses for the minor must be taken A-F and completed with a GPA of at least 3.00.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Course (3 credits)
Take the following course:
FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)

FSOS Electives (3 credits)
Select courses from the following to satisfy the minimum required credits:
FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)
or FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
FSOS 5015 - Family Research Laboratory (1.0 cr)
or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
or FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)

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Information current as of November 07, 2022
Doctoral

Required Courses (12 credits)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)
FSOS 8xxx

Family Research Methods Electives (3 - 4 credits)
Selected courses from the following to satisfy the minimum required credits:

Quantitative Family Research Methods I & Lab (4 credits)
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)

or Family Research Methods (3 credits)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- or FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
Family Social Science Ph.D.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 72 to 75
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Family social science (FSoS) offers a unique program of study using insights and methods of the social sciences to examine how families work within various contexts and cultures. A doctoral degree in family social science provides a broad foundation of expertise in theory, research, and practice.

Your program of study will include research and coursework across the breadth of family social science, including child adjustment in family context; families and culture; families and financial decisions; family formation and intergenerational studies; families, loss, and trauma; and intimate family relationships. Coursework and research engagement, along with intensive mentoring from faculty, prepares students to contribute to the broader field of family science.

Accreditation
This program is accredited by Commission on Accreditation for Marriage and Family Therapy Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Three overall criteria guide admissions decisions: 1) evidence of strong academic preparation and the ability and desire to perform graduate level scholarship, including research; 2) fit of the applicant's professional goals with family social science (FSoS) faculty scholarship and with the overall FSoS mission, that is, enhancing the well-being of diverse families in a changing world; and 3) unique contributions the applicant would make to FSoS values, including social relevance, collaboration, inclusiveness, excellence, innovation, and diversity.

Special Application Requirements:
Family Science Specialization:
Students may apply for admission to the Family Science Ph.D. specialization after completing either a Bachelor's degree or a Master's degree. If you do not already hold a Master's degree, you may apply for the combined Master's/Ph.D. Program.

Couple & Family Therapy Specialization:
The Couple & Family Therapy Ph.D. specialization features rigorous training in couple and family therapy research informed by diverse disciplines and perspectives.

This specialization is accredited by the Commission on Accreditation for Marriage and Family Therapy Education. Admission to the Couple & Family Therapy specialization is available to applicants who have already obtained a clinical Master's degree, or have achieved equivalent clinical experience as determined by the CFT Faculty.
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

48 to 51 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.5 is required for students to remain in good standing.

Courses in the PhD degree program must contribute to an organized program of study and research. The program requires at least 72 credits, including a minimum of 48 course credits and 24 dissertation credits. Coursework includes at least 23 credits in core family theory and research methods, 9 credits in statistics, and 7 credits of directed research. Students are admitted to one of two designated specializations: family science (9 additional credits) or couple and family therapy (12 additional credits).

Students are also required to publish in peer-reviewed journals, present at disciplinary conferences, and demonstrate teaching ability, the ability to translate research into practice, and professional service and leadership. Additionally, all students are required to write research, teaching, outreach and engagement, and leadership and professional service statements. Students in the clinical track are also required to write two Theories of Change papers.

### Core Requirements

Take the following courses for a total of 23 credits:

- FSOS 8200 - Orientation for Family Social Science (1.0 cr)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8002 - Advanced Family Conceptual Frameworks (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- FSOS 8015 - Advanced Qualitative Family Research Methods (3.0 cr)
- FSOS 8014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
- FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)

### Directed Research

Take FSOS 8794 during the first three years of the program for a total of 7 credits.
Take 7 or more credit(s) from the following:

- FSOS 8794 - Directed Research in Family Social Science (1.0 - 6.0 cr)

### Statistics or Methods

Take one of the following statistics/methods sequences for a total of 9 credits:

**Family Science**

- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Advanced Statistics or Methods (3.0 cr)**

- or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
or EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
or NURS 8185 - Qualitative Data Analysis for Health Care Research (3.0 - 4.0 cr)
or NURS 8195 - Mixed Methods Research (2.0 cr)

or Couple & Family Therapy
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
FSOS 8036 - Couple/Marriage and Family Therapy Research (3.0 cr)

Specialization Requirements

Family Science Specialization
Family Science Electives
Take at least 6 credits in consultation with advisor.
FSOS Elective
or PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)

Community/Engagement/Internship Experience
Take 3 credits of coursework to fulfill the specialization's community, engagement, or internship experience requirement, chosen in consultation with advisor.
FSOS 8193 - Directed Study in Family Social Science (1.0 - 6.0 cr)
or Elective (3.0 cr)

-OR-

Couple & Family Therapy Specialization Requirements
Family Therapy Supervision
Take 3 or more credit(s) from the following:
• FSOS 8034 - Marriage and Family Therapy Supervision (3.0 cr)

Family Therapy Practicum
Take FSOS 8295 twice for a total of 6 credits.
Take 6 or more credit(s) from the following:
• FSOS 8196 - Couple/Marriage Family Therapy Practicum (1.0 - 6.0 cr)

Family Therapy Internship
Take 3 or more credit(s) from the following:
• FSOS 8296 - Couple/ Marriage Family Therapy Internship (1.0 - 12.0 cr)
Twin Cities Campus
Human Resource Development M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (MEd)/professional studies program in human resource development (HRD) focuses on training of human resources and organizational change issues. This graduate-level, practitioner-based program can be tailored to meet the needs of individual students. The HRD program is offered by the Department of Organizational Leadership, Policy, and Development (OLPD) in the College of Education and Human Development (CEHD). Courses at the University of Minnesota campus are offered at a variety of times, including late afternoons and evenings. Students may also enroll in courses offered during the summer and at off-campus sites.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
In addition to Statements #1 & 2, applicants must upload or submit a résumé and personal statement describing their career goals and rationale for interest in the M.Ed. program (limit two pages) along with the application. Two letters of recommendation must also be submitted. Applications are accepted on a rolling basis with semester deadlines of March 1 (Summer), July 1 (Fall) and November 1 (Spring).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 22 major credits and 12 credits outside the major. There is no final exam.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Core Course Requirements**
Students not holding an undergraduate degree in HRD must complete at least 34 credits, including the following courses listed below.

Note: For OLPD 5696 at least 4 credits are required and no more than 6 credits will count toward the program.

- **OLPD 5201** - Strategies for Teaching Adults (3.0 cr)
- **OLPD 5605** - Strategic Human Resource Development (3.0 cr)
- **OLPD 5607** - Organization Development (3.0 cr)
- **OLPD 5615** - Training and Development of Human Resources (3.0 cr)
- **OLPD 5617** - Internship: Human Resource Development (1.0 - 10,0 cr)
- **OLPD 5696** - Internship: Human Resource Development (1.0 - 10.0 cr)
- **OLPD 5801** - Survey: Human Resource Development and Adult Education (3.0 cr)
- **OLPD 5819** - Evaluating and Using Research in Organizations and Education (3.0 cr)
- Twelve (12) elective credits approved by a faculty adviser.

**U of M HRD UG Degree Continuing Students**

Students holding an undergraduate HRD degree from the University of Minnesota will not be required to retake courses completed during the undergraduate program. Students must still take a total of 34 credits of graduate coursework in the program. Of this, students must complete at least 16 credits in HRD-designated courses as described below. Note: For OLPD 5696 at least 4 credits are required and no more than 6 credits will count toward the program.

**Required Courses (16 cr)**

- **OLPD 5605** - Strategic Human Resource Development (3.0 cr)
- **OLPD 5696** - Internship: Human Resource Development (1.0 - 10.0 cr)
- **OLPD 5819** - Evaluating and Using Research in Organizations and Education (3.0 cr)

**Option 1 (6 cr)**

- Organization Development Specialization  
  - **OLPD 5607** - Organization Development (3.0 cr)
  - **OLPD 8602** - Advanced Organization Development (3.0 cr)

**Option 2 (6 cr)**

- Training and Development Specialization  
  - **OLPD 5615** - Training and Development of Human Resources (3.0 cr)
  - **OLPD 8601** - Advanced Training and Development of Human Resources (3.0 cr)

**Additional HRD Courses (6 cr)**

- 6 additional HRD credits approved by faculty adviser

**Electives (12 cr)**

- 12 elective credits approved by faculty adviser

**Program Sub-plans**

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

**Rochester**

Requirements for the Rochester sub-plan are the same as those listed in general description. Students may take courses on Twin Cities or Rochester campuses.
Twin Cities Campus
Human Resource Development Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455  
(612-624-1006, fax: 612-624-3377)  
Email: olpd@umn.edu  
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Human Resource Development PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program in human resource development (HRD) focuses on training of human resources and organizational change issues. The HRD program is offered by the Organizational Leadership, Policy, and Development (OLPD) in the College of Education and Human Development (CEHD). Courses at the University of Minnesota campus are offered at a variety of times, including late afternoons and evenings.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students who possess a U.S. bachelor's degree (or international equivalent). Applications are reviewed on an ongoing basis and may be submitted at any time.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Required Courses (9 credits)
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
OLPD 5615 - Training and Development of Human Resources (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
Internship or Field Experience (3-6 credits)
4 credits is recommended for either option below:
OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)

Electives
The remaining credits can be selected from the following:
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
or Additional OLPD courses with adviser approval to make total credits earned equal at least 14 credits.
**Twin Cities Campus**

**Infant and Early Childhood Mental Health Graduate Minor**

*Institute of Child Development*

**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**
Email: icdapply@umn.edu
Website: [https://icd.umn.edu/academics/infant-and-early-childhood-mental-health/graduate-minor/](https://icd.umn.edu/academics/infant-and-early-childhood-mental-health/graduate-minor/)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9 to 12
- Length of program in credits (Doctorate): 12 to 15
- This program requires summer semesters for timely completion.
- Students will have the option to complete a field study at a location of their choosing. This will not be a requirement of the minor, however.

Along with the program-specific requirements listed below, please read the [General Information](https://icd.umn.edu/academics/infant-and-early-childhood-mental-health/graduate-minor/) section of the catalog website for requirements that apply to all major fields.

This program will provide students across diverse disciplines and training programs with access to foundational learning from the field of Infant and Early Childhood Mental Health (IECMH). Students will gain knowledge of developmental processes related to competence, psychopathology, and resilience in the application of theory and research to early childhood and multi-generational practice and policy.

**Program Delivery**

This program is available:
- completely online (all program coursework can be completed online)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Students must be actively pursuing a masters or doctoral degree at the University of Minnesota.

For an online application or for more information about graduate education admissions, see the [General Information](https://icd.umn.edu/academics/infant-and-early-childhood-mental-health/graduate-minor/) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

**Required Courses**

Three foundational courses, for a total of 9 credits, are required for both the masters and doctoral minor.

- **CPSY 5518** - Prevention and Intervention in Early Childhood: Principles (3.0 cr)
- **CPSY 5503** - Development and Psychopathology in Early Childhood (3.0 cr)
- **CPSY 5513** - Early Childhood Assessment (3.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

**Masters**

**Optional Field Experience**

Students pursuing the IECMH masters-level minor may take up to 3 credits of CPSY 5996 in addition to the 9 required course credits. 

CPSY 5996 is an optional opportunity that not required for the minor.

- **CPSY 5996** - Field Experience in Applied Child and Adolescent Development (1.0 - 12.0 cr)
Doctoral

Required Observation Courses
Take exactly 3 course(s) totaling exactly 3 credit(s) from the following:
• CPSY 5506 - Infant Observation Seminar I (1.0 cr)
• CPSY 5508 - Infant Observation Seminar II (1.0 cr)
• CPSY 5511 - Infant Observation Seminar III (1.0 cr)

Optional Field Experience
Students pursuing the IECMH doctoral-level minor may take 3 credits of CPSY 5996 in addition to the 12 required course credits. CPSY 5996 is an optional opportunity that is not required for the minor.
Take exactly 3 credit(s) from the following:
• CPSY 5996 - Field Experience in Applied Child and Adolescent Development (1.0 - 12.0 cr)
Twin Cities Campus
Infant and Early Childhood Mental Health Postbaccalaureate Certificate
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Road, Minneapolis, MN 55455 (612-625-2252; fax: 612-624-6373).
Email: icdapply@umn.edu
Website: https://icd.umn.edu/academics/infant-and-early-childhood-mental-health/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 20
- This program requires summer semesters for timely completion.
- Online.
- Degree: Infant & Early Childhood Mental Health PBac Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota online Infant and Early Childhood Mental Health (IECMH) Certificate Program is an intensive, interdisciplinary postbaccalaureate training program for students and professionals in domains of mental health, health and early care, and education.

The program serves to deepen the knowledge and skills of individuals working in birth-to-five prevention, intervention, program administration, and policy development, and to prepare individuals to provide leadership in expanding the breadth and depth of relationship-based services and policies.

The IECMH certificate program is founded on a core set of principles of infant and early childhood mental health practice, asserting that services to families should be relationship-based, culturally sensitive, grounded in an understanding of developmental theory and research with special attention to the effects of trauma, and supported by reflective practice.

Program Delivery
This program is available:
* completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must hold at least a baccalaureate degree from an accredited college or university in a related area (e.g., child development, social work, child psychology) or document at least two years of work experience in a related field.

The admissions model is cohort-based, with new cohorts usually admitted every other year. Admission to this program is currently suspended, but may be opened for fall 2015 at a future time. Please see our website for more details: http://www.cehd.umn.edu/CEED/certificateprograms/iecmh/admissionprocess.html

Special Application Requirements:
Applicants should have at least two years of documented experience in early childhood research or practice.

International applicants must submit score(s) from one of the following tests:
* TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27
  - Paper Based - Total Score: 550
* IELTS
  - Total Score: 6.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework (20 credits)

Take the following courses. CPSY 5996 must be taken for 2 credits

CPSY 5501 - Foundations in Infant and Early Childhood Mental Health I (3.0 cr)
CPSY 5503 - Development and Psychopathology in Early Childhood (3.0 cr)
CPSY 5506 - Infant Observation Seminar I (1.0 cr)
CPSY 5508 - Infant Observation Seminar II (1.0 cr)
CPSY 5511 - Infant Observation Seminar III (1.0 cr)
CPSY 5513 - Early Childhood Assessment (3.0 cr)
CPSY 5518 - Prevention and Intervention in Early Childhood: Principles (3.0 cr)
CPSY 5521 - Prevention and Intervention in Early Childhood: Practice (3.0 cr)
CPSY 5996 - Field Experience in Applied Child and Adolescent Development (1.0 - 12.0 cr)
Twin Cities Campus
Integrative Leadership Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-624-1006)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/grad-programs/ILM/default.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate-level academic minor in integrative leadership (ILM) will enhance the preparation of graduate students to lead and foster collective actions across boundaries of individuals, groups, organizations, sectors, and nations to solve some of the world's most pressing and complex problems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Prior admission into an established master's, doctoral, or graduate professional degree program is required. Students interested in admission to the minor should contact the ILM director of graduate studies. Admission requires the addition of the required minor coursework to the student's graduate degree program form and the ILM director of graduate studies's signature on the form. Students must demonstrate relevant academic background and experience.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Any student in any University of Minnesota graduate or professional program, regardless of college or enrollment, is encouraged to apply for this minor. Students must already be admitted to a master's, doctoral, or professional degree program at the University of Minnesota.

Doctoral students will need to take an additional course from either the Overview of Leadership Theory or Leading Engagement Processes subgroups to total the 12 credits required of the doctoral minor.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Overview of Leadership Theory
Take 3 - 6 credit(s) from the following:
- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
- OLPD 8021 - Leadership: From Theory to Reflective Practice (3.0 cr)
• PA 5011 - Management of Organizations (3.0 cr)
• PUBH 6780 - Topics in Public Health Administration and Policy (1.0 - 3.0 cr)
• Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the Director of Graduate Studies for the Integrative Leadership Minor.

Leading Engagement Processes
If student is taking PA 5990 to fulfill this requirement it should be for section called "Neighborhood Collaborative Engagement (CHANCE)."

MGMT 6035 is cross listed with LAW 6626.
Take 3 - 6 credit(s) from the following:
• MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
• MGMT 6411 - Corporate Responsibility (2.0 cr)
• OLPD 5736 - Public Engagement and Higher Education (3.0 cr)
• OLPD 6490 - Managing Civic Engagement (3.0 cr)
• PA 5145 - Civic Participation in Public Affairs (3.0 cr)
• PA 5253 (Inactive) 3.0 cr
• PA 5990 - Topics: Public Affairs - General Topics (0.0 - 3.0 cr)
• PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
• Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the Director of Graduate Studies for the Integrative Leadership Minor.

Required Final Course
All students must take one of the following:
LAW 6623 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
or MGMT 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
or OLPD 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
or PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
or PUBH 6702 - Integrative Leadership Seminar (3.0 cr)

Additional Coursework
A minimum of 3 additional credits must be selected from the list of electives below. With permission from the ILM director of graduate studies, students with sufficient background and previous course experience equivalent to one or more courses within the curriculum may apply for waiver of appropriate requirements and replace waived courses with additional electives. PA 5190 is a topics course and topic must be approved by ILM director of graduate studies prior to registering for course.

MGMT 6004 - Negotiation Strategies (2.0 cr)
or MGMT 6032 - Strategic Alliances (2.0 cr)
or MGMT 6034 - Strategic Leadership (2.0 cr)
or MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
or MGMT 6041 - Competing Globally (2.0 cr)
or NURS 7610 - System Leadership and Innovation (3.0 cr)
or OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
or PA 5103 - Leadership and Change (1.5 - 3.0 cr)
or PA 5190 - Topics in Public and Nonprofit Leadership and Management (1.0 - 3.0 cr)
or PA 5251 - Strategic Planning and Management (3.0 cr)
or PA 5405 - Public Policy Implementation (3.0 cr)
or PA 5920 - Skills Workshop (0.5 - 4.0 cr)
or PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)

Masters

Overview of Leadership Theory
Take 3 or more credit(s) from the following:
• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 8021 - Leadership: From Theory to Reflective Practice (3.0 cr)
• PA 5011 - Management of Organizations (3.0 cr)
• PUBH 6780 - Topics in Public Health Administration and Policy (1.0 - 3.0 cr)
• Other

Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the director of graduate studies for the integrative leadership minor.

Leading Engagement Processes
If student is taking PA 5990 to fulfill this requirement it should be for section called "Neighborhood Collaborative Engagement (CHANCE)."

MGMT 6035 is cross listed with LAW 6626.
Take 3 or more credit(s) from the following:
• MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
• MGMT 6411 - Corporate Responsibility (2.0 cr)
• OLPD 5736 - Public Engagement and Higher Education (3.0 cr)
• OLPD 6490 - Managing Civic Engagement (3.0 cr)

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Information current as of November 07, 2022
- PA 5145 - Civic Participation in Public Affairs (3.0 cr)
- PA 5253 [Inactive] (3.0 cr)
- PA 5990 - Topics: Public Affairs - General Topics (0.0 - 3.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- **Other**
  - Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the director of graduate studies for the integrative leadership minor.

**Required Final Course**

All students must take one course from the following:

- LAW 6623 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
- or MGMT 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
- or OLPD 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
- or PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
- or PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
Twin Cities Campus

International Education Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 178 Pillsbury Dr S E Minneapolis, MN 5545-0226 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary minor in international education is for students enrolled in any masters or doctoral program who wish to enter careers in research, consulting, administration, and teaching in an international context. The minor offers a coordinated set of courses from the Departments of Curriculum and Instruction; Educational Psychology; Organizational Leadership, Policy, and Development; the School of Kinesiology; and the Institute of Child Development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Admission is contingent upon being admitted to a master's or a doctoral degree-granting program at the University of Minnesota. For an application form visit the international education minor website (http://www.cehd.umn.edu/olpd/grad-programs/CIDE/gradminor.html) or consult with the director of graduate studies for more information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Each program is developed in consultation with the student, the student's advisor, major director of graduate studies, and director of graduate studies for international education. Requirements include courses listed below. Electives from the University may be added with the advisor's consent and director of graduate studies approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Core Courses
Take 1 or more course(s) from the following:
- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)
• OLPD 8103 - Comparative Education (3.0 cr)

**Area Specific Coursework**

Students interested in OLPD 5080 or OLPD 8087 should consult minor advisor prior to registration, as these courses can vary and may or may not be appropriate for this minor.

Take 6 or more credit(s) from the following:

• CI 5145 - Critical Pedagogy (3.0 cr)
• CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
• CI 8150 - Research Topics in Curriculum & Instruction (3.0 cr)
• CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8650 - Seminar: Special Topics in Second Languages and Cultures Research (1.0 - 3.0 cr)
• EPSY 5403 - Counseling Diverse Populations (3.0 cr)
• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
• OLPD 5107 - Gender, Education, and International Development (3.0 cr)
• OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 5612 - International Human Resource Development (3.0 cr)
• OLPD 5702 - Higher Education in Global Contexts (3.0 cr)
• OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
• OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)
• OLPD 8103 - Comparative Education (3.0 cr)
• OLPD 8842 - Comparative Systems in Organizational Leadership, Policy, and Development (3.0 cr)
• PA 5414 (inactive) (3.0 cr)

**Doctoral Core Courses**

Students interested in OLPD 8087 should consult minor advisor prior to registration, as this course can vary and may or may not be appropriate for this minor.

Take 2 or more course(s) from the following:

• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 5103 - Comparative Education (3.0 cr)
• OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
• OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 5133 - Educational Reform in International Context (3.0 cr)
• OLPD 5137 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
• OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)
• OLPD 8103 - Comparative Education (3.0 cr)
• OLPD 8104 - International Human Resource Development (3.0 cr)
• OLPD 5130 - Educational Reform in International Context (3.0 cr)
• OLPD 8842 - Comparative Systems in Organizational Leadership, Policy, and Development (3.0 cr)
• PA 5414 (inactive) (3.0 cr)

**Area Specific Coursework**

Students interested in OLPD 5080 should consult minor advisor prior to registration, as this course can vary and may or may not be appropriate for this minor.

Take 6 or more credit(s) from the following:

• CI 5145 - Critical Pedagogy (3.0 cr)
• CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
• CI 8150 - Research Topics in Curriculum & Instruction (3.0 cr)
• CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8650 - Seminar: Special Topics in Second Languages and Cultures Research (1.0 - 3.0 cr)
• EPSY 5403 - Counseling Diverse Populations (3.0 cr)
• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
• OLPD 5107 - Gender, Education, and International Development (3.0 cr)
• OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 5612 - International Human Resource Development (3.0 cr)
• OLPD 5702 - Higher Education in Global Contexts (3.0 cr)
• OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
• OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)
- OLPD 8103 - Comparative Education (3.0 cr)
- OLPD 8842 - Comparative Systems in Organizational Leadership, Policy, and Development (3.0 cr)
- PA 5414 (Inactive) (3.0 cr)
Twin Cities Campus
Interpersonal Relationships Research Minor
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, University of Minnesota, S354 Elliott Hall, 75 East River Parkway, Minneapolis, MN 55455 (612-626-0025)
Email: simps108@umn.edu
Website: https://icd.umn.edu/academics/interpersonal-relationships-research-minor/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in interpersonal relationships research provides doctoral students with a broad theoretical and methodological foundation for research on behavioral interaction patterns between two persons and the impact of these interactions.

A recently recognized and rapidly advancing interdisciplinary field of scientific inquiry, interpersonal relationships research has its roots in psychology, sociology, family studies, communication, and nursing. The program brings together faculty and students from eight University departments and schools.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the interpersonal relationships research graduate minor is contingent upon prior admission to a doctoral program in a degree-granting department. Admission to the minor program is limited and only by permission of the director of graduate studies in interpersonal relationships research.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Required Coursework
IREL 8001 - Proseminar in Interpersonal Relationships Research (2.0 cr)
IREL 8021 - Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
or PSY 8202 - Close Relationships (3.0 cr)
6 additional credits selected in consultation with minor adviser.
Twin Cities Campus
K-12 Technology Integration Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: T E L: K-12 Technology Integration PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The K-12 Technology Integration certificate program prepares students to use technology (computers and the web) to develop instructional materials for use in a wide range of educational contexts (note that a university certificate program or certificate is distinct from a state certificate or certification).

The program is designed for K-12 teachers or administrators interested in using technology in the classroom.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one page goal statement. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (12 credits)
Required courses are listed; students will also take one additional CI 5xxx course for 3 credits that complements content area, elementary/secondary focus, and individual interests.

CI 5330 - Special Topics in Learning Technologies (3.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)
CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
Twin Cities Campus

Kinesiology M.S.

Kinesiology, School of

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue SE, Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700).
Email: kin@umn.edu
Website: https://www.cehd.umn.edu/kin/graduate/kin-ms/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Kinesiology spans a wide range of inquiry connected by the common thread of the study of human movement. Graduate programs reflect a broad study of physical activity ranging from exercise science, movement science, and human performance, to physical activity and sport science and sport management. Much of the research conducted in the school is interdisciplinary in nature and involves collaborative partnerships with life science disciplines such as medicine, neuroscience, and epidemiology and fosters links with business, education, and social sciences. MS students pursue an individualized program with an emphasis in one of the following areas: biomechanics and neuromotor control; exercise physiology; perceptual-motor control and learning; physical activity and health promotion; sport and exercise psychology; sport sociology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Although prospective masters students generally have an undergraduate degree in kinesiology or the health sciences, others with a baccalaureate degree who have related preparation and a significant background and interest in the scientific study of physical activity may be admitted.

Special Application Requirements:
Applicants must submit a University of Minnesota Graduate Admissions application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts.

Priority deadline for submission of all application materials is December 1 for the following fall admission. Students generally are admitted for the fall semester only.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations: GRE, TOEFL, IELTS, MELAB.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 18 major credits and 12 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is an independent research project with the advisor that meets the following guidelines: Involves a total of approximately 120 hours of work; demonstrates familiarity with the tools of research and scholarship in the field of kinesiology; demonstrates the ability to work independently; and demonstrates the ability to effectively present the results of the investigation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The MS is offered under Plan A and Plan B. Plan A requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field (either of which must include a minimum of 3 credits in statistics as determined by faculty advisor) and 10 thesis credits (8777). Plan B also requires 30 credits, including at least 14 major course credits in kinesiology, a capstone project of 4 credits in KIN 8995, at least 6 course credits in a minor or related field (either of which must include a minimum of 3 credits in statistics as determined by faculty advisor), and 6 additional credits in any of these areas.

For both Plan A and Plan B, students must take KIN 5981 (3 cr), KIN 8980 (3 cr), and in the related field or minor, at least 3 credits of statistics or equivalent as defined by the faculty advisor. A GPA of at least 3.00 is required to maintain good academic standing and to graduate.

A maximum of 9 credits of 4xxx-level courses is allowed at the discretion of the faculty advisor.

**Required courses**

Students must complete the following courses and an area of emphasis listed below.

**KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)**

**KIN 8980 - Graduate Research Seminar in Kinesiology (3.0 cr)**

**Plan A**
- Plan A students must take 10 credits of KIN 8777.
  - KIN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B**
- Plan B students must take 4 credits of KIN 8995.
  - KIN 8995 - Research Problems in Kinesiology (1.0 - 12.0 cr)

**Emphasis Areas**

Kinesiology MS students concentrate their studies in one of the following areas: biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, physical activity and health promotion, sport and exercise psychology, or sport sociology.

**Biomechanics and Neuromotor Control**

The study of human biomechanics with its focus on the mechanical and electrophysiological analysis of human motion is combined with the study of movement neuroscience. This emphasis area provides advanced knowledge for understanding how the human nervous system controls movement and how the neurological disease affects motor function.

**Recommended Courses**
A minimum of 8 major course credits (not including KIN 8777) are needed outside of the requirements and may be chosen from the following list.

- **KIN 4441** - Movement Neuroscience (3.0 cr)
- **KIN 5235** - Advanced Biomechanics II: Kinetics (3.0 cr)
- **KIN 5643** - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
- **KIN 5941** - Clinical Movement Neuroscience (3.0 cr)
- **KIN 8132** - Seminar: Motor Development (3.0 cr)
- **KIN 8135** - Seminar: Motor Control and Learning (3.0 cr)
- **KIN 8211** - Seminar: Perception and Action (3.0 cr)
- **KIN 8995** - Research Problems in Kinesiology (1.0 - 12.0 cr)
- **RSC 5135** - Advanced Biomechanics I: Kinematics (3.0 cr)

**Minor or related field**

Either minor or related field is chosen, Plan A and Plan B students must take one statistics course with the consultation with their advisor. Plan A students take an additional 3 related-field (other emphasis areas of KIN or outside programs) credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below. Recommended minor is Clinical Physiology and Movement Science.

- **EPSY 8264** - Advanced Multiple Regression Analysis (3.0 cr)
- **EPSY 8267** - Applied Multivariate Analysis (3.0 cr)
- **PUBH 6450** - Biostatistics I (4.0 cr)
- **PUBH 6451** - Biostatistics II (4.0 cr)
- **PUBH 7405** - Biostatistical Inference I (4.0 cr)
- **PUBH 7406** - Biostatistical Inference II (3.0 cr)
- **STAT 5021** - Statistical Analysis (4.0 cr)
- **STAT 5302** - Applied Regression Analysis (4.0 cr)
- **STAT 5303** - Designing Experiments (4.0 cr)
- **STAT 5601** - Nonparametric Methods (3.0 cr)
- **KIN 5987** - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

-OR-

**Exercise Physiology**

Exercise physiology is the study of issues related to acute and chronic effects of physical activity on human physiological systems and health, and how fundamental concepts of human energetics and mechanics apply to exercise, sport, physical exertion, and health promotion. In addition to the MS requirements, students choose courses from the following lists with advisor consultation.

Plan A and Plan B students take a minimum of 8 major course credits chosen from the following list.

- **KIN 5122** - Applied Exercise Physiology (3.0 cr)
- **KIN 5141** - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- **KIN 5142** - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
- **KIN 5328** - International Sport: The Impact of the Olympic Games [HIS, GP] (3.0 cr)
- **KIN 5385** - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- **KIN 5435** - Advanced Theory and Techniques of Exercise Science (3.0 cr)
- **KIN 5485** - Exercise Testing and Prescription (3.0 cr)
- **KIN 5585** - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- **KIN 8122** - Seminar: Exercise Physiology (2.0 cr)
- **EDHD 8300** - Special Topics in Education and Human Development (1.0 - 8.0 cr)

**Minor or related field**

Either minor or related field is chosen, Plan A and Plan B students must take one statistics course with the consultation with their advisor. Plan A students take an additional 3 related-field (other emphasis areas of KIN or outside programs) credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below.

- **EPSY 5261** - Introductory Statistical Methods (3.0 cr)
- **PUBH 6450** - Biostatistics I (4.0 cr)
- **PUBH 6451** - Biostatistics II (4.0 cr)
- **PUBH 7405** - Biostatistical Inference I (4.0 cr)
- **PUBH 7406** - Biostatistical Inference II (3.0 cr)
- **STAT 5021** - Statistical Analysis (4.0 cr)
- **STAT 5302** - Applied Regression Analysis (4.0 cr)
- **STAT 5303** - Designing Experiments (4.0 cr)
- **STAT 5601** - Nonparametric Methods (3.0 cr)

-OR-

**Perceptual-Motor Control and Learning**

Students study the learning of movement skills and the factors that mediate learning as well as the changes in movement behavior over the life span and the processes or factors underlying these changes. In addition to the MS requirements, students choose courses from the following lists with advisor consultation. Registration for KIN 5992 is limited to 3 credits. A maximum of 9 4xxx level courses can be taken at the discretion of the advisor and used to satisfy master credit requirement.
Recommended courses
Plan A and Plan B students take a minimum of 8 major course credits chosen from the following list.
KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
or
KIN 4134 - The Aging Motor System (3.0 cr)
or
KIN 4136 - Embodied Cognition (3.0 cr)
or
KIN 4441 - Movement Neuroscience (3.0 cr)
or
KIN 4520 - Current Topics in Kinesiology (2.0 - 4.0 cr)
or
KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
or
KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
or
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
or
KIN 5992 - Readings in Kinesiology (1.0 - 9.0 cr)
or
KIN 8132 - Seminar: Motor Development (3.0 cr)
or
KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
or
KIN 8211 - Seminar: Perception and Action (3.0 cr)
or
HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
or
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
or
Minor or related field
Either minor or related field is chosen. Plan A and Plan B students must take one statistics course with the consultation with their advisor. Plan A students take an additional 3 related-field (other emphasis areas of KIN or outside programs) credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below.
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
-OR-
Physical Activity and Health Promotion
The emphasis area in Physical Activity and Health promotion is intended to provide students with advanced study in physical activity and health promotion and disease prevention, as well as study designs from an epidemiological approach. The emphasis area provides a solid foundation sufficient to understand and conduct research in this field. In addition to the MS requirements, students choose courses from the following lists with advisor consultation.
Recommended Courses
A minimum of 8-semester course credits with KIN prefix and may be chosen from the following list.
KIN 5202 - Current Issues in Health (2.0 cr)
or
KIN 5203 - Health Media, Consumerism, and Communication (2.0 cr)
or
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
or
KIN 5125 - Advances in Physical Activity and Health (3.0 cr)
or
KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
or
KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
or
KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
or
KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
or
KIN 8126 - Sports Medicine Psychology (3.0 cr)
or
KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)
Minor or related field
Either minor or related field is chosen. Plan A and Plan B students must take one statistics course with the consultation with their advisor. Plan A students take an additional 3 related-field (other emphasis areas of KIN or outside programs) credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below.
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
or
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
or
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
or
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
or
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
or
PUBH 6450 - Biostatistics I (4.0 cr)
or
PUBH 6451 - Biostatistics II (4.0 cr)
or
PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
or
PUBH 6810 - Survey Research Methods (3.0 cr)
or
PUBH 6914 - Community Nutrition Intervention (3.0 cr)
-OR-
Sport and Exercise Psychology
The Sport and Exercise Psychology emphasis focuses on the thoughts, feelings, and actions of participants and professionals within physical activity contexts such as competitive sports, sports medicine and rehabilitation, exercise, and physical education. Scholars seek to understand the cognitive, affective, behavioral, and social mechanisms underlying interactions between the psychology of individual participants and influences of psychological climates within physical activity settings.
Recommended Courses
For Plan A and Plan B, a minimum of 8 major course credits are needed and may be chosen from the following list.
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
or KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
or KIN 5136 - Psychology of Coaching (3.0 cr)
or KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
or KIN 8126 - Sports Medicine Psychology (3.0 cr)
or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

Minor or related field
Either minor or related field is chosen. Plan A and Plan B students must take one statistics course with the consultation with their advisor. Plan A students take an additional 3 related-field (other emphasis areas of KIN or outside programs) credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below.

Recommended minor is educational psychology.
CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
or CPSY 5302 - Cognitive and Biological Development (3.0 cr)
or CSPH 5706 - Lifestyle Medicine (2.0 cr)
or CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
or EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 5401 - Counseling Procedures (3.0 cr)
or EPSY 5402 - Counseling History and Theories (3.0 cr)
or EPSY 5406 - Ethics in Counseling (3.0 cr)
or EPSY 8251 - Statistical Methods in Education I (3.0 cr)
or GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
or KIN 5371 - Sport and Society (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
or KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
or PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
or PREV 8002 - Prevention Science Research Methodology (3.0 cr)
or PREV 8003 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)
or PSY 5207 - Personality and Social Behavior (3.0 cr)
or PSY 8208 - Social Psychology: The Self (3.0 cr)
or PSY 8617 - Ethical and Equitable Decisions in Clinical Science and Counseling Psychology (3.0 cr)
or PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
or PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

-OR-

Sport Sociology
Sport sociology is the scientific study of human behavior and social organization in the sport context, focusing on behavior patterns and social processes that occur in the organizational and management systems in which sport exists. The program is housed in the Tucker Center for Research on Girls & Women in Sport, an interdisciplinary research institute. In addition to the MS requirements, students choose courses from the following lists with advisor consultation.

Recommended Courses
For Plan A and Plan B, a minimum of 8 major course credits are needed may be chosen from the following list.
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
or KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
or KIN 5136 - Psychology of Coaching (3.0 cr)
or KIN 5371 - Sport and Society (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
or KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
or KIN 5801 - Legal Aspects of Sport and Physical Activity (4.0 cr)
or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

Minor or related field
Either minor or related field is chosen. Plan A and Plan B students must take one statistics course with the consultation with their advisor. Plan A students take an additional 3 related-field (other emphasis areas of KIN or outside programs) credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below.
AMST 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
or COMM 5221 - Media, Race, and Identity (3.0 cr)
or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
or EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 8251 - Statistical Methods in Education I (3.0 cr)
or EPSY 8252 - Statistical Methods in Education II (3.0 cr)
or GWSS 5104 - Transnational Feminist Theory (3.0 cr)
or GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
or GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
or GWSS 8101 - Intellectual History of Feminism (3.0 cr)
or GWSS 8102 - Advanced Studies in Sexuality (3.0 cr)
or GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
or KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
or PSY 8209 - Research Methods in Social Psychology (3.0 cr)
or SOC 4451 - Sport, Culture & Society (3.0 cr)
or SOC 8801 - Sociological Research Methods (4.0 cr)
Twin Cities Campus

Kinesiology Minor
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700).
Email: kin@umn.edu
Website: https://www.cehd.umn.edu/kin/academics/default.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Master's students can choose a kinesiology minor in the following emphasis areas: behavioral aspects of physical activity, biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, physical activity and health, sport and exercise psychology, and sport sociology. Doctoral students can pursue a kinesiology minor in these same emphasis areas, with the addition of the sport management emphasis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires at least 6 credits of graduate-level kinesiology courses. A doctoral minor requires at least 12 credits of graduate-level kinesiology courses. Courses should be chosen in consultation with the student's major advisor and the School of Kinesiology's director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Minor Courses
Minor requires at least 6 credits of graduate-level kinesiology courses. Courses should be chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.

Doctoral
Minor Courses
Minor requires at least 12 credits of graduate-level kinesiology courses. Courses should be chosen in consultation with the student's major advisor and the School of Kinesiology's director of graduate studies.
Twin Cities Campus
Kinesiology Ph.D.
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue SE, Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: https://www.cehd.umn.edu/kin/graduate/kin-phd/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Kinesiology spans a wide range of inquiry connected by the common thread of the study of human movement. Graduate programs reflect a broad study of physical activity ranging from exercise science, movement science, and human performance, to physical activity and sport science and sport management. Much of the research conducted in the school is interdisciplinary in nature and involves collaborative partnerships with life science disciplines such as medicine, neuroscience, and epidemiology and fosters links with business, education, and social sciences. MS students pursue an individualized program with an emphasis in one of the following areas: biomechanics and neuromotor control; exercise physiology; perceptual-motor control and learning; physical activity and health promotion; sport and exercise psychology; sport sociology.

Ph.D. students pursue an individualized program with an emphasis in biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, physical activity and health promotion, sport and exercise psychology, sport management, or sport sociology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

It is preferred that applicants have completed a master’s degree in the field of kinesiology or a related field and achieved an overall minimum GPA of 3.50.

Other requirements to be completed before admission:
Applicants must have completed a baccalaureate degree, generally in the following areas: kinesiology; exercise science; sport management; sport psychology/sociology; movement science; or related preparation and significant background and interest in the scientific study of physical activity.

Special Application Requirements:
Applicants must submit a University of Minnesota application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three recommendations from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts.
Submission of all application materials by December 1 ensures priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students are admitted for the fall semester only.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4.5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

### Program Requirements

24 to 29 credits are required in the major.
12 to 19 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires 36 to 48 course credits and 24 thesis credits. A minimum total of 60 credits and a maximum total of 72 credits are required to complete the program. Course credits include a minimum of 15 major program credits (including 3 credits of KIN 8980 Graduate Research Seminar), 6 credits in a supporting program or 12 credits in a doctoral minor, 6 research skills course credits, and 9 credits of mentored research experience. At least 6 major course credits, 6 research skills course credits, and 6 mentored experience course credits must be taken as a U of M enrolled student. A GPA of at least 3.00 is required to maintain good standing and to graduate.

### Required Kinesiology Courses

A minimum of 3 credits of KIN 8980 and a minimum of 9 credits of KIN 8995 are required over the course of the program for all emphasis areas listed below.

- **KIN 8980 - Graduate Research Seminar in Kinesiology** (3.0 cr)
- **KIN 8995 - Research Problems in Kinesiology** (1.0 - 12.0 cr)

### Emphasis Areas

Kinesiology Ph.D. students pursue an individualized program with an emphasis in biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, physical activity and health promotion, sport and exercise psychology, sport management, or sport sociology.

### Biomechanics and Neuromotor Control

The study of human biomechanics with its focus on the mechanical and electrophysiological analysis of human motion is combined with the study of movement neuroscience. This emphasis area provides advanced knowledge for understanding how the human nervous system controls movement and how the neurological disease affects motor function.

### Emphasis courses

A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.

- **KIN 5235 - Advanced Biomechanics II: Kinetics** (3.0 cr)
- **KIN 5643 - Applied Motion Capture and Movement Analysis Technology** (3.0 cr)
- **KIN 5941 - Clinical Movement Neuroscience** (3.0 cr)
- **KIN 8211 - Seminar: Perception and Action** (3.0 cr)
- **KIN 8132 - Seminar: Motor Development** (3.0 cr)
- **KIN 8135 - Seminar: Motor Control and Learning** (3.0 cr)
- **RSC 5135 - Advanced Biomechanics I: Kinematics** (3.0 cr)
- **NSC 5661 - Behavioral Neuroscience** (3.0 cr)
Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. Courses taken to fulfill the research skills courses requirement can't be double counted to fulfill the supporting program requirement.

EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or
PUBH 6450 - Biostatistics I (4.0 cr)
or
PUBH 6451 - Biostatistics II (4.0 cr)
or
PUBH 7405 - Biostatistical Inference I (4.0 cr)
or
PUBH 7406 - Biostatistical Inference II (3.0 cr)
or
STAT 5021 - Statistical Analysis (4.0 cr)
or
STAT 5302 - Applied Regression Analysis (4.0 cr)
or
STAT 5303 - Designing Experiments (4.0 cr)
or
STAT 5601 - Nonparametric Methods (3.0 cr)

Minor
Choose either minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: CGSC, CPMS, GERO, HUMF, NSC, or PREV.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include exercise physiology, perceptual-motor control and learning, physical activity and sport science, or sport management. Recommended program areas for supporting courses include: BMEN, ME, NURS, OT, OTOL, PUBH, NSC, and RSC.

KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)
or
KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

-OR-

Exercise Physiology
Exercise physiology is the study of issues related to acute and chronic effects of physical activity on human physiological systems and health, and how fundamental concepts of human energetics and mechanics apply to exercise, sport, physical exertion, and health promotion. Doctoral students learn to apply principles of physiology to solving problems related to functional responses and adaptations involved in human skeletal muscular activity.

Emphasis courses
A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx. KIN 8122 may be taken multiple times.

KIN 5122 - Applied Exercise Physiology (3.0 cr)
or
KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
or
KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
or
KIN 5328 - International Sport: The Impact of the Olympic Games [HIS, GP] (3.0 cr)
or
KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
or
KIN 5435 - Advanced Theory and Techniques of Exercise Science (3.0 cr)
or
KIN 5485 - Exercise Testing and Prescription (3.0 cr)
or
KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
or
KIN 5641 - Scientific Theory and Application of Training and Conditioning in Sport (3.0 cr)
or
KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
or
EDHD 8300 - Special Topics in Education and Human Development (1.0 - 8.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. It is recommended to take a statistical sequence in either EPSY, STAT, or PUBH. It is not recommended to switch courses between departments unless agreed to by the advisor. Courses taken to fulfill the research skills courses requirement can't be double counted to fulfill the supporting program requirement.

EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or
PUBH 6450 - Biostatistics I (4.0 cr)
or
PUBH 6451 - Biostatistics II (4.0 cr)
or
PUBH 7405 - Biostatistical Inference I (4.0 cr)
or
PUBH 7406 - Biostatistical Inference II (3.0 cr)
or
STAT 5021 - Statistical Analysis (4.0 cr)
or
STAT 5302 - Applied Regression Analysis (4.0 cr)
or
STAT 5303 - Designing Experiments (4.0 cr)
or
STAT 5601 - Nonparametric Methods (3.0 cr)

Minor
Choose either a minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: CGSC, CPMS, GERO, HUMF, NSC, or PREV.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the
advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, perceptual-motor control and learning, physical activity and sport science, or sport management. Recommended areas for supporting program include: BIOC, FSCN, OT, PHSL, PUBH, NSC, and RSC.

-OR-

**Perceptual-Motor Control and Learning**

Perceptual-motor control and learning includes related areas of movement behavior inquiry. Motor learning is the study of the learning of movement skills and the factors that mediate learning, such as practice, perceptual guidance, or knowledge of results. Although a lifespan approach is emphasized, students may focus on one or more specific age periods, such as early childhood, adolescence, adulthood, or aging.

**Emphasis courses**

A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.

- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- or KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
- or KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- or KIN 8211 - Seminar: Perception and Action (3.0 cr)
- or KIN 8132 - Seminar: Motor Development (3.0 cr)
- or KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- or RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)

**Research skills courses**

A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. It is recommended to take a statistical sequence in either EPSY, STAT, or PUBH. It is not recommended to switch courses between departments unless agreed to by the advisor. Courses taken to fulfill the research skills courses can't be double counted to fulfill the supporting program requirement.

- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- or EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- or PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6451 - Biostatistics II (4.0 cr)
- or PUBH 7405 - Biostatistical Inference I (4.0 cr)
- or PUBH 7406 - Biostatistical Inference II (3.0 cr)
- or STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- or STAT 5302 - Applied Regression Analysis (4.0 cr)
- or STAT 5303 - Designing Experiments (4.0 cr)
- or STAT 5601 - Nonparametric Methods (3.0 cr)

**Minor**

Choose either a minor or supporting program. All University of Minnesota doctoral minors require a minimum of 12 credits. Recommended minors include CGSC, CPMS, GERO, HUMF, NSC, or PREV.

**Supporting program**

Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, exercise physiology, physical activity and sport science, or sport management. Recommended programs for supporting courses include: BMEN, ME, NURS, OT, OTOL, PubH, NSC, and RSC. Specific KIN course recommendations include:

- KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)
- or KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

-OR-

**Physical Activity and Health Promotion**

The emphasis area in Physical Activity and Health promotion is intended to provide students with advanced study in physical activity and health promotion and disease prevention, as well as study designs from an epidemiological approach. The emphasis area will provide a solid foundation sufficient to understand and conduct research in this field.

**Emphasis courses**

A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.

- KIN 5202 - Current Issues in Health (2.0 cr)
- or KIN 5203 - Health Media, Consumerism, and Communication (2.0 cr)
- or KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
- or KIN 5125 - Advances in Physical Activity and Health (3.0 cr)
- or KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
- or KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- or KIN 5371 - Sport and Society (3.0 cr)
- or KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- or KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- or KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
- or KIN 8126 - Sports Medicine Psychology (3.0 cr)
- or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

**Research skills courses**
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. Courses taken to fulfill the research skills credits can’t be double counted to fulfill the supporting program requirement.

KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)

or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)

or EPSY 8251 - Statistical Methods in Education I (3.0 cr)

or EPSY 8252 - Statistical Methods in Education II (3.0 cr)

or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)

or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)

or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

or EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)

or PUBH 6450 - Biostatistics I (4.0 cr)

or PUBH 6451 - Biostatistics II (4.0 cr)

or PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)

or PUBH 6673 - Grant Writing for Public Health (1.0 cr)

or PUBH 6810 - Survey Research Methods (3.0 cr)

or PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)

or PUBH 7405 - Biostatistical Inference I (4.0 cr)

or PUBH 7406 - Biostatistical Inference II (3.0 cr)

or STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)

or STAT 5302 - Applied Regression Analysis (4.0 cr)

or STAT 5303 - Designing Experiments (4.0 cr)

or STAT 5601 - Nonparametric Methods (3.0 cr)

Minor

Choose either minor or supporting program, may include only 5xxx level courses or higher. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: CGSC, CPMS, GERO, CSPH, NSC, PREV, or PUBH.

Supporting Program

Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, exercise physiology, physical activity and sport science, or sport management. Recommended programs for supporting courses include NURS, NSC, RSC, CSPH, PREV.

-OR-

Sport and Exercise Psychology

The Sport and Exercise Psychology emphasis focuses on the thoughts, feelings, and actions of participants and professionals within physical activity contexts such as competitive sports, sports medicine and rehabilitation, exercise, and physical education. Scholars seek to understand the cognitive, affective, behavioral, and social mechanisms underlying interactions between the psychology of individual participants and influences of psychological climates within physical activity settings.

Emphasis courses

A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.

KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)

or KIN 5136 - Psychology of Coaching (3.0 cr)

or KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)

or KIN 8126 - Sports Medicine Psychology (3.0 cr)

or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

Research skills courses

A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. Courses taken to fulfill the research skills course credits can’t be double counted to fulfill the supporting program requirement.

KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)

or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)

or EPSY 8251 - Statistical Methods in Education I (3.0 cr)

or EPSY 8252 - Statistical Methods in Education II (3.0 cr)

or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)

or EPSY 8265 - Factor Analysis (3.0 cr)

or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)

or EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)

Minor

Choose either minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: CPSY, EPSY, or PSY.

Supporting Program

Recommended supporting program courses include combining 6-13 credits of advisor-approved selections from other emphasis areas within kinesiology (KIN), such as (but not limited to) behavioral aspects of physical activity (e.g.KIN 5123), sport sociology (e.g.KIN 5371 or KIN 5511) or sport management (e.g. KIN 5601 or KIN 5725) and/or from other graduate programs [e.g., CPSY, EPSY, PSY, CSPH, GRAD, PREV, or PUBH.]

CPSY 5301 - Advanced Developmental Psychology (3.0 cr)

or CPSY 5302 - Cognitive and Biological Development (3.0 cr)
or CSPH 5706 - Lifestyle Medicine (2.0 cr)
or CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
or EPSY 5401 - Counseling Procedures (3.0 cr)
or EPSY 5402 - Counseling History and Theories (3.0 cr)
or EPSY 5406 - Ethics in Counseling (3.0 cr)
or GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
or KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
or KIN 5371 - Sport and Society (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
or KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
or PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
or PREV 8002 - Prevention Science Research Methodology (3.0 cr)
or PREV 8003 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)
or PSY 8208 - Social Psychology: The Self (3.0 cr)
or PSY 8617 - Ethical and Equitable Decisions in Clinical Science and Counseling Psychology (3.0 cr)
or PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
or PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

-OR-

Sports Management
This emphasis concentrates on the theoretical and practical dimensions of the management of athletic events, sports teams and facilities, and the sporting process. The management areas studied include those in the public sector (interscholastic and intercollegiate sport) as well as fitness and facility management. Sport management policy and ethics are also a focus of this emphasis area and research agenda.

Required courses
KIN 8128 - Doctoral Sport Management Seminar (3.0 cr)

Program courses
A minimum of 9 credits must be selected from the following list:
KIN 5371 - Sport and Society (3.0 cr)
or KIN 5421 - Sport Finance (3.0 cr)
or KIN 5461 - Issues in the Sport Industry (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
or KIN 5631 - Programming and Promotion in Sport (3.0 cr)
or KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
or KIN 5801 - Legal Aspects of Sport and Physical Activity (4.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor.
Courses taken to fulfill the research skills courses requirement can't be double counted to fulfill the supporting program requirement.
KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)
or OLPD 5056 - Case Studies for Policy Research (3.0 cr)
or OLPD 5061 - Ethnographic Research Methods (3.0 cr)
or EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
or EPSY 8251 - Statistical Methods in Education I (3.0 cr)
or EPSY 8252 - Statistical Methods in Education II (3.0 cr)
or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or EPSY 8265 - Factor Analysis (3.0 cr)
or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
or SOC 8801 - Sociological Research Methods (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)

Minor
Choose either a minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: public policy, COMM, EPSY, BA, or CI.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, exercise physiology, physical activity and sport science, and perceptual-motor control and learning. Recommended program areas for supporting program courses include: OLPD, PA, COMM, marketing, and management.
Sport Sociology

Sport Sociology is the scientific study of human behavior and social organization in the sport context with the primary objective to attempt to identify, describe and explain the role and relationship of sport in society. It focuses on the behavior patterns and social processes that occur in the sporting domain and explores the organizational and management systems and structures in which sport exists.

Emphasis courses

A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.

- KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
- or KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
- or KIN 5136 - Psychology of Coaching (3.0 cr)
- or KIN 5371 - Sport and Society (3.0 cr)
- or KIN 5511 - Sport and Gender (3.0 cr)
- or KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
- or KIN 8126 - Sports Medicine Psychology (3.0 cr)
- or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

Research skills courses

A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. Courses taken to fulfill the research skills courses requirement can't be double counted to fulfill the supporting program requirement.

- AMST 8250 - Popular Culture and Politics in the 20th Century: Research Strategies (3.0 cr)
- or AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- or COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
- or COMM 8451 - Seminar: Intercultural and Diversity Research (3.0 cr)
- or COMM 8502 - Seminar: Communication Theory Construction (3.0 cr)
- or KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)
- or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- or EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- or EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- or EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- or GWSS 8997 - Dissertation Seminar (3.0 cr)
- or PSY 8209 - Research Methods in Social Psychology (3.0 cr)
- or PUBH 6810 - Survey Research Methods (3.0 cr)
- or PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- or PUBH 7405 - Biostatistical Inference I (4.0 cr)
- or PUBH 7406 - Biostatistical Inference II (3.0 cr)
- or SOC 8801 - Sociological Research Methods (4.0 cr)
- or SOC 8811 - Advanced Social Statistics (4.0 cr)
- or SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)

Minor

Choose either minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: AMST, COMM, CPSY, CSPH, EPSY, GWSS, PUBH, PSY, or SOC.

Supporting program

Recommended supporting programs and courses include selections from EPSY, PSY, and CPSY minor programs as well as from other emphasis areas of kinesiology (KIN), such as behavioral aspects of physical activity, sport sociology, or sport management. Other relevant supporting program courses can be found in public health (PUBH), sociology (SOC), center for spirituality and healing (CSPH), or prevention science (PREV).

- AMST 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
- or AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
- or AMST 8240 - Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development (3.0 cr)
- or COMM 5221 - Media, Race, and Identity (3.0 cr)
- or COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
- or COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
- or GWSS 5104 - Transnational Feminist Theory (3.0 cr)
- or GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
- or GWSS 5406 - Black Feminist Thought in the African and African Diasporas (3.0 cr)
- or GWSS 8101 - Intellectual History of Feminism (3.0 cr)
- or GWSS 8102 - Advanced Studies in Sexuality (3.0 cr)
- or GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
- or GWSS 8107 - Feminist Pedagogies (3.0 cr)
- or GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
- or GWSS 8109 - Feminist Knowledge Production (3.0 cr)
- or GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
- or GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)

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or GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
or GWSS 8270 - Seminar: Theories of Body (3.0 cr)
or SOC 4451 - Sport, Culture & Society (3.0 cr)
or SOC 5455 - Sociology of Education (3.0 cr)
or SOC 8001 - Sociology as a Profession (1.0 cr)
or SOC 8011 - Teaching Sociology: Theory & Practice (3.0 cr)
or SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
or SOC 8221 - Sociology of Gender (3.0 cr)
or SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
or SOC 8701 - Sociological Theory (4.0 cr)
Twin Cities Campus
Leadership in Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377).
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (MEd)/professional studies program in leadership in education, offered jointly by the Department of Organizational Leadership, Policy, and Development (OLPD) and the Department of Curriculum and Instruction (C&I) in the College of Education and Human Development (CEHD), builds leadership skills and facilitates analysis of K-12 school culture, policies, and practice.

This program develops educational leaders who can serve in schools that foster continuous learning and improvement. Program participants are prepared to advance team, school-wide, and district-wide reform initiatives for coherent educational systems and programs. This program addresses formal and informal leadership methods, emphasizing the roles and contributions of teachers as leaders of instructional improvement, including ways that teachers and principals work together to promote collaborative school cultures.

This 30-semester credit program emphasizes the essential components of leadership, including collaboration, group dynamics, continuous professional learning, school policy, school culture, design and facilitation of improvement initiatives, innovations in teaching and assessment practice, creation of coherent learning experiences, cross-cultural education, and technology.

Students are encouraged to begin the program with other educators from the same school or district. Most students complete the degree in two to three years while continuing to teach full time. Some degree coursework is offered at convenient, off-campus sites in the Twin Cities area.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have teaching experience.

Special Application Requirements:
Applications are reviewed on an ongoing basis, but students are advised to submit application materials by the following preferred dates: November 1 (Spring), March 1 (Summer), July 1 (Fall). International students must apply six weeks earlier than those dates listed.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

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Information current as of November 07, 2022
- Paper Based - Total Score: 550
  • IELTS
  - Total Score: 6.5
  • MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Course Requirements

OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)
OLPD 5374 - Leadership for Professional Development (4.0 cr)
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
  or OLPD 5387 - Leadership for Teaching and Learning (3.0 cr)
CI 5177 - Practical Research (1.0 - 3.0 cr)
  or OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5361 - Project in Teacher Leadership (3.0 cr)

Electives

14 or more credits of elective courses with adviser approval. Students often choose elective credits aligned with certificates in staff development, school technology, reading, and school administration.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester

This sub-plan is not accepting new students at this time. Course requirements are the same as the Twin Cities program.

Singapore

Course requirements are the same as the Twin Cities program.
Twin Cities Campus
Learning Analytics Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: https://www.cehd.umn.edu/ci/programs/professional-education/graduate-certificate/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Learning Analytics Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Learning Analytics postbaccalaureate certificate aims to develop skills in the use of data to optimize learning and the environments in which it occurs. Learning analytics uses the power of information technology and data science to improve learning and teaching in various contexts.

With the rise of big data, knowing how to effectively and ethically utilize educational data to inform research and practice is crucial. The Learning Analytics Certificate advances these missions by leveraging information technology, data analytics, and learning sciences to better inform educational research and practice.

The certificate is structured to develop understanding in three core areas - foundations, theory, and analytics - while offering flexibility in coursework to accommodate students from different academic backgrounds and programs.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited college or university in psychology, education, computer science, math, statistics, engineering, or a related field.

Other requirements to be completed before admission:
The undergraduate degree must include research methods and statistics.

Special Application Requirements:
International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Coursework (9 credits)
Select 3 credits from each of the following areas, in consultation with the advisor, for a total of 9 credits.

Foundations (3 credits)
Take the following course:
CI 5371 - Learning Analytics: Theory and Practice (3.0 cr)

Theory (3 credits)
Select 3 credits from the following in consultation with the advisor:
CI 5331 - Introduction to Learning Technologies (3.0 cr)
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)

Analytics (3 credits)
Select 3 credits from the following in consultation with the advisor:
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)

Elective Coursework (3 credits)
Select 3 credits from the following in consultation with the advisor. Courses applied to the required coursework requirement cannot also be applied as an elective.
CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
CI 8371 - Applied Social Network Analysis in Education (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
Twin Cities Campus
Learning Sciences Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: psyf-adm@umn.edu
Website: https://www.cehd.umn.edu/edpsych/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Learning Sciences Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Learning Sciences post-baccalaureate certificate provides a strong foundation in learning theory and methodology across diverse educational environments to promote effective design, implementation, and assessment of human learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
The undergraduate degree must include at least one course in research methods and one course in basic statistics.

International students who want to attend this program on a student visa should contact the University’s International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required coursework (9 credits)
Students must take 3 credits from each of the following categories:
Theory Course (3 credits)
Select 1 of the following in consultation with the advisor:
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)

Methods Course (3 credits)
Select 1 of the following in consultation with the advisor:
EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)

Design Course (3 credits)
Select 1 of the following in consultation with the advisor:
CI 5362 - Foundations of Interactive Design for Web-based Learning (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)

Elective Course (3 credits)
Select one of the following from any category, in consultation with the advisor:
Theory
EPSY 5121 - Debugging Failure in Learning (3.0 cr)
EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8121 - Play-based Learning (3.0 cr)
EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)
PSY 8541 - Multicultural Psychology (3.0 cr)

Methods
EPSY 8119 - Video-Based Microlongitudinal Research in Learning (3.0 cr)
CI 5371 - Learning Analytics: Theory and Practice (3.0 cr)
CI 8371 - Applied Social Network Analysis in Education (3.0 cr)

Design
CI 5325 - Designing and Developing Online Distance Learning (3.0 cr)
CSCI 5125 - Collaborative and Social Computing (3.0 cr)
**Twin Cities Campus**

**Literacy Education M.Ed.**

**Curriculum & Instruction**

**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**

Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)

Email: Clinfo@umn.edu

Website: [http://cehd.umn.edu/ci](http://cehd.umn.edu/ci)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the [General Information](http://cehd.umn.edu/ci) section of the catalog website for requirements that apply to all major fields.

The master of education (MED)/professional studies program in literacy education is designed to improve the quality of literacy education in K-12 schools. The program aims to address the growing state and national emphasis on pupils' reading skills and achievement.

The literacy education program provides instruction on current developments in literacy theory and research, as well as teaching methods for reading, writing, language, speech, and media studies. Students will learn to develop instructional units, evaluate and assess K-12 pupils' literacy skills, and develop technology tools to teach them. The program also encourages students to become "literacy leaders" in their schools and school systems.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited college or university.

**Special Application Requirements:**

Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a clearly written statement of career interests, goals, and objectives. Master's applications are reviewed by department faculty three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](http://cehd.umn.edu/ci) (TOEFL, IELTS, MELAB).
Program Requirements
Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Coursework (6 credits)
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

Literacy Education Requirements (18 credits)
Select from the courses listed below or choose another graduate level CI 54xx course with adviser approval.
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5431 - Introduction to Instructional Leadership in K-12 Reading (3.0 cr)
- CI 5432 - Instructional Leadership in Reading in Kindergarten and the Elementary Grades (3.0 cr)
- CI 5433 - Instructional Leadership in Reading for the Middle and Secondary Grades (3.0 cr)
- CI 5434 - Professional Development and Evolving Practice in K-12 Reading (3.0 cr)
- CI 5435 - Instructional Leadership in Preventing Reading Difficulties (3.0 cr)
- CI 5441 - Teaching Literature in the Secondary School (2.0 - 3.0 cr)
- CI 5442 - Adolescent Literature, Youth Activism and Climate Change Literacy (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5461 - Teaching Composition in the Secondary School (3.0 cr)
- CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)

Electives (6 credits)
Courses will be selected in consultation with faculty advisor; students may also select other graduate level 5xxx courses with adviser approval. Students are advised to select courses that reflect learning issues faced in their classroom, including special education, secondary language, or cultural diversity issues.
- CI 5331 - Introduction to Learning Technologies (3.0 cr)
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (2.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5642 - Assessing English Learners (3.0 cr)
- CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- YOST 5952 - Everyday Lives of Youth (3.0 cr)
- YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
- ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5151 - Cooperative Learning (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
Twin Cities Campus

Online Distance Learning Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Online Distance Learning Postbaccalaureate Cert.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The online distance learning certificate is designed to prepare educators and other professionals to design and deliver distance learning opportunities in academic or business settings (note that a university certificate program or certificate is distinct from a state certificate or certification). Technology experience is not required, and courses are designed for learners with a wide range of experience.

This 12-credit certificate program will prepare students to successfully design, develop, and deliver curriculum on the Internet; use interactive online media; and create online learning communities for business and K-12 and postsecondary schools. As schools and businesses embrace online education, a variety of instructional design guidelines and pedagogical approaches have been developed to effectively guide online education and enhance learning.

Goals of the distance learning certificate include:
- Developing knowledge and skills in the best practices for designing and delivering online distance learning
- Engaging with current research about distance learning, current practices, and learning theory
- Providing opportunities to practice designing, developing, and delivering online distance learning
- Creating learning communities where students can reflect on their own teaching, reading, designing, and writing
- Allowing students to learn from each other

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one page goal statement. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
- Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (12 credits)
Cl 5321 - Foundations of Distance Education (3.0 cr)
Cl 5323 - Online Learning Communities (3.0 cr)
Cl 5325 - Designing and Developing Online Distance Learning (3.0 cr)
Cl 5371 - Learning Analytics: Theory and Practice (3.0 cr)
Twin Cities Campus
Organizational Leadership, Policy, and Development Ed.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 58 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Admission to the Education Policy and Leadership track, the Higher Education track, and the Human Resource Development track of the Ed.D. are currently suspended.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Its research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the EdD programs choose from one of three complementary but distinct program tracks: education policy and leadership (EPL), higher education (HE), and human resource development (HRD). The department offers M.A. and Ph.D. degrees in the tracks mentioned above, as well as comparative and international development education (CIDE) and evaluation studies (ES). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is required. The preferred graduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of academic transcripts, and a current résumé, as well as answer required essay questions via the University's online application system. International students must also submit a TOEFL or IELTS score. Unofficial GRE scores, transcripts, and TOEFL/IELTS score may be submitted via the online application for admission review purposes only. Admitted students must submit official GRE scores (as applicable), transcripts (sent directly from institution[s]), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer. Applicants to the international cohorts should have at least three years of experience in international education.

Special Application Requirements:
Admission to the Education Policy and Leadership track, the Higher Education track, and the Human Resource Development track of the Ed.D. are currently suspended.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements
34 credits are required in the major.
12 to 14 credits are required outside the major.
12 to 24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The doctor of education (Ed.D.) is a professionally oriented degree program for those who will provide leadership in educational institutions and work and community education environments. Students combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of their program area. The Ed.D. is offered in 3 OLPD tracks: EPL (pre-K-12 schools), higher education and HRD. Cohorts for the EPL and higher education tracks include those in the metropolitan area, out state Minnesota, and international schools. Those two Ed.D. degree tracks are offered only in the context of cohort programs of 20-30 students each. All Ed.D. cohort programs include department core courses, program core courses, inquiry and research courses, supporting program or minor, and field research project credits. Through courses, seminars, and independent study, students learn to apply the products of disciplined inquiry to educational policy issues and practical situations in various educational environments and conduct types of research that contribute and/or apply that knowledge to the specialization. Within the overall framework (some credits may be brought in from previous graduate work), specific course requirements are developed for each program area and cohort when applicable. See the department website for requirements in specific cohorts. Preliminary written and oral exams are required. Students must complete a professional field project that contributes to the improvement of policy or practice.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Education Policy and Leadership
The EPL EdD track is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Higher Education
The higher education EdD track is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Human Resource Development
The HRD EdD track is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Research Courses
Students should consult with advisers about the appropriate time to register for each course.
OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)
a 3 credit statistics course to be determined by student and adviser (3 cr inside or outside department)
a qualitative course to be determined by student and adviser (3 cr; inside or outside department)
a quantitative course to be determined by student and adviser (3 cr inside or outside department)
OLPD 8890 - Research Seminar (1.0 cr)

Additional Rsch Course
- a 3 credits qualitative course taken with adviser approval
or OLPD 8812 - Quantitative Research in Education (3.0 cr)

Skills and Special Topics
19 credits minimum. OLPD 8011 must be taken during the first year of the program.
OLPD 8011 - Doctoral Research Seminar I (1.0 cr)
18 credits of HRD elective coursework jointly determined by student and adviser based around the student's professional role

Specialization
Must total 12 credits.
A 3 credit OLPD 8xxx level theory seminar course as determined by the adviser
9 additional credits of appropriate coursework as determined by the faculty adviser

Rochester
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Same as general program description.

This sub-plan is not accepting new students.
Twin Cities Campus
Organizational Leadership, Policy, and Development M.A.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and human resource development (HRD).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit two letters of recommendation from persons familiar with their scholarship and research potential, transcripts, a current résumé, and answers to two essay questions found within the University's online application. All applications for admission are reviewed once a year. All new students begin in fall semester unless permission to start earlier is granted by the track coordinator. The annual deadline is February 1 for the two-year MA program. The annual deadline is February 1 for one-year MA program options (not available for the HRD or MCTL tracks).

Letters of recommendation, résumé, essays, and other department application materials are submitted via the University online application system. Unofficial transcripts and TOEFL/IELTS score may also be submitted via the online application for admission review purposes only. Admitted students must submit transcripts (sent directly from institution[s]), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer.

Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in social science, liberal arts, public affairs, and business fields. The department offers study opportunities for professionals who are employed full time as well as for those who wish to pursue graduate studies full time.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 to 26 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 to 28 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Comparative and International Development Education

The Comparative and International Development Education (CIDE) track is offered as Plan A (34 credits) and Plan B (30 credits).

Program Specialization (6 credits)

Select one of the following program specializations in consultation with the advisor.

Comparative and International Development Education
Select 6 credits from the following in consultation with the advisor:
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5121 - Educational Reform in International Context (3.0 cr)

or Intercultural/International Education
Select 6 credits from the following in consultation with the advisor:
- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
- OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
- OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)

Research Design and Methods (3 credits)

Select 3 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor approval.
- CI 5116 - Action Research in Educational Settings (3.0 cr)
- CI 5177 - Practical Research (1.0 - 3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
- OLPD 5502 - Comparative Evaluation Theory for Practice (3.0 cr)
- OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
- OLPD 5613 - Survey of Research Methods and Emerging Research in Human Resource Development (3.0 cr)
- OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Research Seminar (3 to 6 credits)

Plan A students take 3 credits of OLPD 5087; Plan B students (one-year program) take 3 credits of OLPD 5087 and 3 credits of OLPD 5095; and Plan B students (two-year program) select 3 credits of OLPD 5087 or OLPD 5095 in consultation with the advisor.
- OLPD 5087 - MA Research Seminar (3.0 cr)
- OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
Outside Coursework (6 credits)
Select 6 non-CIDE credits in consultation with the advisor.

Electives
Plan A students select electives as needed to complete the 24 course credits required, and Plan B students select credits as needed to complete the 30-credit requirement. Courses are selected in consultation with the advisor. 8xxx courses require advisor approval.

Specialization coursework not applied to that requirement can count as an elective.

OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
OLPD 5126 - Anthropology of Education (3.0 cr)
OLPD 5702 - Higher Education in Global Contexts (3.0 cr)
OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 8101 - International Education and Development (3.0 cr)
OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)
OLPD 8103 - Comparative Education (3.0 cr)
OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)
OLPD 8302 - Educational Policy Perspectives (3.0 cr)

Plan A Option

Thesis Credits
Plan A Students take 10 master's thesis credits.
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Education Policy and Leadership
The Education Policy and Leadership (EPL) track is offered as Plan A (30-36 credits) and Plan B (30-32 credits).

Plan Options

Plan A

Program Core (6 credits)
Select 3 credits from the following in consultation with the advisor:
OLPD 5041 - Sociology of Education (3.0 cr)
OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)
OLPD 8302 - Educational Policy Perspectives (3.0 cr)
Select 3 credits from the following. Advisor approval is required.
OLPD 5001 - Formal Organizations in Education (3.0 cr)
OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)

Research Design and Methods (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses can be selected with advisor approval.
CI 5116 - Action Research in Educational Settings (3.0 cr)
CI 5177 - Practical Research (1.0 - 3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)
OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
OLPD 5613 - Survey of Research Methods and Emerging Research in Human Resource Development (3.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Outside Coursework (6 credits)
Select 6 non-EPL credits in consultation with the advisor.

Electives
Select electives as needed, in consultation with the advisor, to complete the minimum course credit requirement for Plan A.

Thesis Credits
Take 10 master's thesis credits.
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Required Coursework (6 credits)
Select 1 of the following courses in consultation with the advisor:
OLPD 5607 - Organization Development (3.0 cr)
OLPD 8302 - Educational Policy Perspectives (3.0 cr)
Select 1 of the following courses in consultation with the advisor:
OLPD 5001 - Formal Organizations in Education (3.0 cr)
OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)

Program Core (6 credits)
Select 1 of the following courses in consultation with the advisor:
OLPD 5047 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5304 - Context and Practice of Educational Leadership (3.0 cr)
Select 1 of the following courses in consultation with the advisor:
OLPD 5041 - Sociology of Education (3.0 cr)
OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
OLPD 5128 - Anthropology of Education (3.0 cr)
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5346 - Politics of Education (3.0 cr)

Research Design and Methods (3 credits)
Take the following course:
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Colloquium Paper (3 to 6 credits)
Plan B students (one-year program) take 3 credits of OLPD 5087 and 3 credits of OLPD 5095; and Plan B students (two-year program) select 3 credits of OLPD 5087 or OLPD 5095 in consultation with the advisor.
OLPD 5087 - MA Research Seminar (3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

Outside Coursework (6 credits)
Select 6 non-EPL credits in consultation with the advisor.

Electives
Select electives as needed, in consultation with the advisor, to complete the 30-32 credit requirement for the Plan B.

Evaluation Studies
The Evaluation Studies (ES) track is offered as Plan A (31-32 credits) and Plan B (30-32 credits).

Program Core (9 credits)
Take the following courses. Take OLPD 8596 for 3 credits.
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)
OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

Research Design and Methods (6 credits)
Select 1 qualitative methods course and 1 quantitative methods course, in consultation with the advisor, to meet the 6-credit requirement.

Outside Coursework (6 credits)
Select 6 non-ES credits in consultation with the advisor.

Electives (6 to 16 credits)
Select electives as needed, in consultation with the advisor, to complete the 31-32 course credits required for the Plan A, and to meet the 30-32-credit minimum for the Plan B.

Plan Options

Plan A

Thesis Credits
Plan A students take 10 master's thesis credits.
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Colloquium Paper (3 to 6 credits)
Plan B students (one-year program) take 3 credits of OLPD 5087 and 3 credits of OLPD 5095; and Plan B students (two-year program) select 3 credits of OLPD 5087 or OLPD 5095 in consultation with the advisor.
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 5087 - MA Research Seminar (3.0 cr)

Higher Education
The Higher Education (HE) track is offered as Plan A (34 credits) and Plan B (30 credits).

Required Coursework (9 credits)
Take the following courses:
OLPD 5701 - U.S. Higher Education (3.0 cr)
OLPD 5709 - Critical Issues in Higher Education (3.0 cr)
OLPD 5712 - College Student Development Theory and Practice (3.0 cr)

Research Design and Methods (3 credits)
Select at least 3 credits from the following in consultation with the advisor. Students in the one-year program are encouraged to take a non-OLPD course.
CI 5116 - Action Research in Educational Settings (3.0 cr)
CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 8812 - Quantitative Research in Education (3.0 cr)

Program Area (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
OLPD 5001 - Formal Organizations in Education (3.0 cr)
OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
OLPD 5704 - College Students Today (3.0 cr)
OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
OLPD 5724 - Leadership and Administration of Student Affairs (2.0 - 3.0 cr)
OLPD 5731 - The Law and Postsecondary Institutions (3.0 cr)
OLPD 5736 - Public Engagement and Higher Education (3.0 cr)

Outside Coursework (6 credits)
Select 6 non-HE credits in consultation with the advisor.

Plan Options

Plan A
Thesis Credits
Plan A students take 10 master's thesis credits.
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Colloquium Paper (3 to 6 credits)
Plan B students (one-year program) take 3 credits of OLPD 5087 and 3 credits of OLPD 5095; and Plan B students (two-year program) select 3 credits of OLPD 5087 or OLPD 5095 in consultation with the advisor.
OLPD 5087 - MA Research Seminar (3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

Human Resource Development
The Human Resource Development (HRD) track is offered as Plan A (36 credits) and Plan B (34 credits).

General Aspects (3 credits)
Take the following course:
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)

Program Core (16 credits)
Take OLPD 5696 for 4 credits. Other courses may be applied to this requirement with advisor approval.
OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
Research (7 credits)

Take the following courses. Take OLPD 5095 for 1 credit.

- OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
- OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Select 3 credits of qualitative or quantitative research from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.

- ANTH 8001 - Ethnography, Theory, History (3.0 cr)
- ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
- CI 8079 - Arts Based Research in Education (3.0 cr)
- CI 8085 - Narrative Inquiry in Education (3.0 cr)
- CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
- CI 8146 - Critical Ethnography in Education (3.0 cr)
- CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CI 8162 - Research Experience II: Data Analysis and Manuscript Preparation (3.0 cr)
- CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
- CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- CI 8913 - Interpretive Research (3.0 cr)
- EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
- NURS 8172 - Theory and Theory Development for Research (3.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)
- OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)
- OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)

Electives

Select electives as needed, in consultation with the advisor, to complete the 26 course credits required for the Plan A or the Plan B 34-credit minimum.

Plan Options

Plan A

Thesis Credits

Plan A students take 10 master's thesis credits.

- OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Plan B Project Paper (3 credits)

Plan B students take at least 3 credits of the following in consultation with the advisor and committee.

- OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
Twin Cities Campus
Organizational Leadership, Policy, and Development Ph.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
The Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 70 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Its research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and human resource development (HRD).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in social science, liberal arts, business, and education fields. The department offers study opportunities for professionals who are employed full-time, as well as for those who wish to pursue graduate studies full-time.

Special Application Requirements:
Applicants must submit two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of academic transcripts, and a current résumé; as well as answer required essay questions via the University online application system. Transcripts and TOEFL/IELTS score may be submitted via the online application for admission review purposes only. Admitted students must submit transcripts (sent directly from institution[s]), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer.

All applications for admission are reviewed once per year for Fall admission. Submission of all application materials for all tracks by December 1 is strongly encouraged to ensure priority consideration for assistantships awarded for the next academic year. All new students begin in fall semester unless special permission to start earlier is granted by the program coordinator.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
Program Requirements
31 to 37 credits are required in the major.
11 to 17 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The PhD is available in five program tracks: education policy and leadership, evaluation studies, higher education, comparative and international development education, and human resource development. Credit requirements vary by track.

Professional Socialization Seminar (1 credit)
Take the following seminar fall term of the first year of study:
OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

Research Coursework
Research Design Course (3 credits)
Take the following course spring term of the first year of study:
OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)

Quantitative Research Course (3 credits)
Select 3 credits from the following in consultation with the advisor:
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
CI 5116 - Action Research in Educational Settings (3.0 cr)
CI 5177 - Practical Research (1.0 - 3.0 cr)
CI 8079 - Arts Based Research in Education (3.0 cr)
CI 8085 - Narrative Inquiry in Education (3.0 cr)
CI 8146 - Critical Ethnography in Education (3.0 cr)
CI 8147 - Critical Discourse Analysis in Educational Research (3.0 cr)
CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
CI 8162 - Research Experience II: Data Analysis and Manuscript Preparation (3.0 cr)
CI 8165 - Queer and Feminist Theories: Collective Memory Research Methods (3.0 cr)
CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
CI 8913 - Interpretive Research (3.0 cr)
NURS 8172 - Theory and Theory Development for Research (3.0 cr)
NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)

Qualitative Research Course (3 credits)
Select 3 credits from the following in consultation with the advisor:
CI 8145 - Using Mixed Methods in Educational Research (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
OLPD 5613 - Survey of Research Methods and Emerging Research in Human Resource Development (3.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Methods Courses (6 credits)
Select 6 credits from the following in consultation with the advisor. Courses from the above quantitative and qualitative lists not applied to those requirements can be chosen with advisor approval.
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)
OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)
OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
OLPD 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Comparative and International Development Education
CIDE uses an interdisciplinary approach to the study of education's role in economic, political, and sociocultural development; international educational exchange; and the internationalization of education. The two specializations within CIDE are comparative and international development education and intercultural/international education.

The CIDE track requires 72 total credits: 36 major credits (16 Program Core plus 20 CIDE-specific), 12 outside credits, and 24 doctoral thesis credits.

CIDE Seminars (9 credits)
Take 3 credits of OLPD 8121 3 times for a total of 9 credits. Take section 002 spring term of the first year of study, followed by section 003 and section 004.
OLPD 8121 - Doctoral Seminar: Comparative and International Development Education (1.0 - 6.0 cr)

Specialization Courses (6 credits)
Select 1 of the following specializations in consultation with the advisor. At least 1 of the courses must be at the 8xxx level.

Comparative and International Development Education
Select 6 credits from the following in consultation with the advisor:
OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5121 - Educational Reform in International Context (3.0 cr)
OLPD 8101 - International Education and Development (3.0 cr)
OLPD 8103 - Comparative Education (3.0 cr)

or Intercultural/International Education
Select 6 credits from the following in consultation with the advisor:
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)

Electives (5 credits)
Select 5 credits from the following in consultation with the advisor. Specialization courses listed above, not applied to the specialization requirement, can be used as an elective with advisor approval.
OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
OLPD 5128 - Anthropology of Education (3.0 cr)
OLPD 5702 - Higher Education in Global Contexts (3.0 cr)
OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 8102 - Dynamics of Intercultural Communication in Education (3.0 cr)
OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)
OLPD 8105 - Qualitative Longitudinal Research Methods and Analysis in Education (3.0 cr)

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Information current as of November 07, 2022
OLPD 8302 - Educational Policy Perspectives (3.0 cr)

**Outside Coursework (12 credits)**
Select 12 non-CIDE credits in consultation with the advisor.

**Education Policy and Leadership**
The Education Policy and Leadership (EPL) track provides an opportunity for intensive study of the field of education. It is especially suitable for students who wish to pursue careers in policy, research, or college and university teaching. It is also available to students who are interested in careers in school, district, and statewide administration, though it is more theory and research-oriented than the doctorate of education (EdD) degree, which is also offered by OLPD.

The EPL track requires 70 total credits: 34 major credits (16 Program Core plus 18 EPL-specific), 12 outside credits, and 24 doctoral thesis credits.

**Education Policy and Leadership Coursework**

**Core Courses (12 credits)**
Take the following courses:
- OLPD 5346 - Politics of Education (3.0 cr)
- OLPD 8021 - Leadership: From Theory to Reflective Practice (3.0 cr)
- OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)
- OLPD 8302 - Educational Policy Perspectives (3.0 cr)

**Organizations Course (3 credits)**
Select 1 of the following in consultation with the advisor. OLPD 5001 is strongly recommended.
- OLPD 5001 - Formal Organizations in Education (3.0 cr)
- OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
- OLPD 5607 - Organization Development (3.0 cr)

**Electives (3 credits)**
Select electives (OLPD 50xx/80xx; OLPD 53xx/83xx) from the following in consultation with the advisor. Other courses may be chosen with advisor approval.
- OLPD 5xxx
- OLPD 8xxx

**Outside Coursework (12 credits)**
Select 12 non-EPL credits in consultation with the advisor.

**Evaluation Studies**
The Evaluation Studies (ES) track provides an opportunity for intensive study of the techniques and process of evaluation and policy research and of the social and political context within which program evaluation occurs. Graduates leave with a portfolio filled with evidence of their expertise with the tools of the evaluation trade—qualitative and quantitative inquiry methods, communication skills, and computer database analysis experience. Evaluation knowledge and skills are gleaned not only from time in the classroom but also from internships and collaboration with evaluation professionals in real-world settings. Evaluation studies students have access to some of the best evaluators in the field.

The ES track requires 72 total credits: 31 major credits (16 Program Core plus 15 EPL-specific), 17 outside credits, and 24 doctoral thesis credits.

**Evaluation Studies Core Courses (15 credits)**
Take the following courses. Take OLPD 8595 for 3 credits. Take 3 credits of OLPD 8596 in two semesters for a total of 6 credits.
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
- OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)
- OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)
- OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

**Outside Coursework (17 credits)**
Select 17 non-ES credits in consultation with the advisor.

**Higher Education**
The Higher Education (HE) track provides an opportunity for intensive study of the policies and organizational issues in higher education institutions and systems. HE focuses on the experiences, practices, and decisions of those involved in postsecondary education, as well as on the sociopolitical contexts in which higher education exists. Areas of specialization include administration and organization, policy, college students, external relations, equity-oriented change, and research integrity.
The HE track requires 72 total credits: 37 major credits (16 Program Core plus 21 HE-specific), 11 outside credits, and 24 doctoral thesis credits.

Higher Education Core Courses (9 credits)
Take the following courses:
- OLPD 5701 - U.S. Higher Education (3.0 cr)
- OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
- OLPD 8703 - Public Policy in Higher Education (3.0 cr)
Electives (12 credits)
Select electives (OLPD 50xx/80xx; OLPD 57xx/87xx) from the following in consultation with the advisor. Other courses may be chosen with advisor approval.
- OLPD 5xxx
- OLPD 8xxx
- OLPD 5704 - College Students Today (3.0 cr)
Outside Coursework (11 credits)
Select 11 non-HE credits in consultation with the advisor.

Human Resource Development
The Human Resource Development (HRD) track is offered by the Department of Organizational Leadership, Policy, and Development (OLPD). Students in HRD combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of work and community education; social, economic, historical, political, cultural, educational, technological, and psychological contexts within which work and community education exist; and types of research that contribute to or apply that knowledge to the specialization.

The HRD track requires 72 total credits: 34 major credits (16 Program Core plus 18 HRD-specific), 14 outside credits, and 24 doctoral thesis credits.

Specialization Courses (9 credits)
Theory Seminar (3 credits)
Select one of the following seminars. Pre-approval by the advisor is required.
- OLPD 8601 - Advanced Training and Development of Human Resources (3.0 cr)
- OLPD 8602 - Advanced Organization Development (3.0 cr)
HRD Seminars (6 credits)
Select 6 credits from the following. OLPD 8601 or 8602, if not applied to the theory seminar requirement, can chosen with advisor approval.
- OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)
- OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
- OLPD 8095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
Statistics Course (3 credits)
Select 3 credits of Statistics from the Methods Course list that were not applied to the Departmental Core requirement. Advisor approval is required.
Capstone Research Course (6 credits)
Take the following twice in consultation with the advisor.
- OLPD 8603 - HRD Capstone Research Experience (3.0 cr)
Outside Coursework (14 credits)
Select 14 non-HRD credits in consultation with the advisor.
Twin Cities Campus
Parent Education Postbaccalaureate Certificate
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, St Paul MN 55108 (612-625-2705; fax: 612-625-4227)
Email: famed@umn.edu
Website: http://www.cehd.umn.edu/fsos/programs/index.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15 to 18
- This program does not require summer semesters for timely completion.
- Degree: Parent Education PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The parent education certificate prepares well-qualified, parent education professionals to deliver programs designed to address the intellectual, emotional, cultural, social, and physical needs of parents and children in a variety of educational settings. These professionals will be positioned to work in a wide variety of areas, including some school-based parent education programs, preschools, child care centers, Head Start programs, health care and social-service agencies and institutions, and faith-based settings.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited institution in family studies, child psychology, early childhood education, nutrition, or related fields. A 2.80 overall GPA in undergraduate work.

Special Application Requirements:
Application deadlines are March 1 and October 1. Apply online at: https://choose.umn.edu/apply/

For program specific application details see: http://www.cehd.umn.edu/fsos/programs/professional/certificate/how-to-apply.html

Complete the equivalent of three semester undergraduate or graduate credits in child development courses before entering the parent education certificate program. If these credits have not been completed at the time of application, the applicant may be admitted conditionally until they are completed and recorded on a transcript. Prerequisite coursework cannot be applied toward the certificates credit requirements. Possible CEHD courses that meet the child development requirement include:

CPSY 5301 - Advanced Developmental Psychology
CPSY 5261 - Early Learning in Infancy and Toddlerhood
CPSY 5302 - Cognitive and Biological Development
CPSY 5303 - Social and Emotional Development

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of November 07, 2022
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Courses (15 credits)

Take the following courses:

- FSOS 5937 - Parent-Child Interaction (3.0 cr)
- FSOS 5942 - Diverse Family Experiences (3.0 cr)
- FSOS 5944 - Curricular Design in Parent Education (3.0 cr)
- FSOS 5945 - Teaching and Learning in Parent Education (3.0 cr)
- FSOS 5946 - Assessment and Evaluation in Parent Education (3.0 cr)

Optional Coursework (0-3 credits)

Professionals who desire additional classroom experience are recommended to take the following additional course:

- FSOS 5949 - Student Teaching in Parent Education (3.0 cr)
Twin Cities Campus
Physical Activity and Health M.Ed.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Website: https://www.cehd.umn.edu/kin/academics/grad/med-pah.html

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.Ed. in physical activity and Health relates to the M.P.H. in community health promotion in the School of Public Health in the following ways:

1. The ultimate goals of the programs are to promote health and prevent chronic diseases;
2. Both programs study the distribution and determinants of health-related states or events in specified populations; and
3. Both programs adopt population-based interventions.

However, they are essentially different in that the M.P.H. in community health promotion focuses on designing community-based program and policy interventions that improved the health of communities while the proposed M.Ed. in physical activity and health focuses on applied training of physical activity professionals to increase physical activity in various populations.

There are limited prerequisites for this program. Students with a background in kinesiology, exercise science, public health, biology, and/or psychology will be able apply for the program. There is minimal overlap with the existing M.Ed. programs at School of Kinesiology and the existing M.P.H. programs at School of Public Health.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Kinesiology, exercise science, public health, biology, psychology

Master degree

Other requirements to be completed before admission:
There are no course requirements for admission except for a Bachelor degree and acceptance to the University of Minnesota Graduate School.

Special Application Requirements:
The School reviews applications on an ongoing basis. Application reviews for specific academic terms begin by the following dates:
- November 1: spring semester admission
- March 1: summer session admission
- July 1: fall semester admission (priority deadline May1)

Admission requirements for this program include the following criteria:
A bachelor's degree, preferably in kinesiology, exercise science, public health, biology, psychology, with a 3.0 minimum grade point average (GPA) from an accredited institution.

All applicants must submit the following items:
- Online application
Application fee ($75 for U.S. applicants; $95 for international applicants)
- Unofficial transcripts of all previous post-secondary academic study must be downloaded to the application (official transcripts will be required if accepted)
- Personal statement describing career goals and rationale for interest in the program
- Diversity statement
- Resume

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

**Plan C:** Plan C requires 26 major credits and 4 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** Students will enroll in 3 hrs of KIN 5995 Research Problems in Kinesiology to complete their Capstone project. The requirement is a literature review on a particular topic approved by their advisor. Below are the details for the literature review.

1. Research Question Development: (20% of Capstone grade)
2. Literature Review Matrix: (20% of Capstone grade)
3. Literature Review Final Draft: (60% of Capstone grade)

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

### Required Courses

Students are required to take at least 9 credits in this category. Students need to take at least 3 credits of KIN 5995 after the majority of the coursework is completed.

- **KIN 5181** - Understanding Kinesiology Research (3.0 cr)
- **KIN 5125** - Advances in Physical Activity and Health (3.0 cr)
- **KIN 5995** - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)

### Selected Courses

Students must take at least 21 credits for selected courses, of which a minimum of 17 credits from KIN and 4 credits from PUBH courses:

- **KIN 4134** - The Aging Motor System (3.0 cr)
- **KIN 4214** - Health Promotion (3.0 cr)
- **KIN 4385** - Exercise Physiology (4.0 cr)
- **KIN 4687** - Principles and Theory of Sports Coaching (3.0 cr)
- **KIN 5104** - Physical Activities for Persons with Disablities (3.0 cr)
- **KIN 5122** - Applied Exercise Physiology (3.0 cr)
- **KIN 5123** - Motivational Interventions in Physical Activity (3.0 cr)
- **KIN 5125** - Advances in Physical Activity and Health (3.0 cr)
- **KIN 5126** - Social Psychology of Sport & Physical Activity (3.0 cr)
- **KIN 5141** - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- **KIN 5202** - Current Issues in Health (2.0 cr)
- **KIN 5203** - Health Media, Consumerism, and Communication (2.0 cr)
KIN 5328 - International Sport: The Impact of the Olympic Games [HIS, GP] (3.0 cr)
KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
KIN 5485 - Exercise Testing and Prescription (3.0 cr)
KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6914 - Community Nutrition Intervention (3.0 cr)
PUBH 6954 - Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations (2.0 cr)
**Twin Cities Campus**

**PK-12 Administration Postbaccalaureate Certificate**

Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

**Contact Information:**
Department of Organizational Leadership, Policy, and Leadership, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455 (612-626-8647; fax: 612-624-3377)
Email: olpd@umn.edu
Website: [http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html](http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 20 to 23
- This program requires summer semesters for timely completion.
- Degree: PK-12 Administration PBacc Certificate

Along with the program-specific requirements listed below, please read the [General Information](http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html) section of the catalog website for requirements that apply to all major fields.

The PK-12 Administration post-baccalaureate certificate, housed within the University's Department of Organizational Leadership, Policy, and Development, offers coursework specifically designed to address competencies required by the state of Minnesota for the following licenses: K-12 Principal; Superintendent; Director of Special Education; and Director of Community Education.

**Accreditation**
This program is accredited by Minnesota Board of School Administrators and the NCATE.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

**Special Application Requirements:**
Applications are reviewed on a rolling basis.


Please note: The PK-12 Administration certificate is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to [test abbreviations](http://www.cehd.umn.edu/OLPD/apply/certificate/administrative-licensure/)(TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html) section of the
catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

A grade of C or better is required for coursework taken on the A/F grading basis.

An electronic portfolio, presented to a review panel made up of representatives from the University and licensed practitioners, is required.

The University of Minnesota does not award licensure. The Professional Educator Licensing and Standards Board (PELSB) determines licensure for the state of Minnesota in the areas of teacher education and related services. For school administrative licensure, the Minnesota Board of School Administrators (BOSA) determines licensure in Minnesota.

Please refer to https://www.cehd.umn.edu/teaching/ for the most up to date licensure requirements, as they are subject to change.

Focus Areas

K-12 Principal (23 credits)

Take the following courses:
OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5348 - Leaders of Human Resources Administration (3.0 cr)
OLPD 5384 - Special Education Law for Leaders (1.0 cr)
OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
OLPD 5387 - Leadership for Teaching and Learning (3.0 cr)
OLPD 5388 - Leadership for Master(ful) Scheduling (2.0 cr)
OLPD 5396 - Field Experience in PK-12 Administration: Authentic Practice in Leadership (3.0 cr)

-OR-

Superintendent (22 credits)

Take the following courses:
OLPD 5322 - Leaders in the Superintendentcy and Central Office (3.0 cr)
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5348 - Leaders of Human Resources Administration (3.0 cr)
OLPD 5376 - Leading School Tax Elections (1.0 cr)
OLPD 5384 - Special Education Law for Leaders (1.0 cr)
OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
OLPD 5387 - Leadership for Teaching and Learning (3.0 cr)
OLPD 5396 - Field Experience in PK-12 Administration: Authentic Practice in Leadership (3.0 cr)

-OR-

Director of Special Education (22 credits)

Take the following courses:
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5348 - Leaders of Human Resources Administration (3.0 cr)
OLPD 5368 - Leadership for Special Education Services (3.0 cr)
OLPD 5375 - Special Education Finance: Program Models, Policy, and Law (2.0 cr)
OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
OLPD 5387 - Leadership for Teaching and Learning (3.0 cr)
OLPD 5396 - Field Experience in PK-12 Administration: Authentic Practice in Leadership (3.0 cr)

-OR-

Director of Community Education (20 credits)
Take the following courses:
OLPD 5389 - Community Education Leadership (3.0 cr)
OLPD 5377 - Leadership in Community Education Finance and Law (1.0 cr)
OLPD 5396 - Field Experience in PK-12 Administration: Authentic Practice in Leadership (3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5348 - Leaders of Human Resources Administration (3.0 cr)
OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
Twin Cities Campus
Prevention Science Minor
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Prevention Science Program, 290 McNeal Hall, 1985 Buford Avenue St Paul, MN 55108 (612-625-1900; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: https://www.cehd.umn.edu/fsos/programs/phd/prev-sci-minor.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Prevention science is defined for the purposes of this program as the scientific study of systematic efforts to reduce the incidence of unhealthy or maladaptive behavior, and to promote health and adaptive behavior in populations across the life span through designing and evaluating interventions, and utilizing knowledge about them more strategically.

The fundamental assumption of this free-standing minor is that future researchers and scholars will be most able to meet the challenges and changes occurring in society and in their chosen professions and disciplines if their training is comprehensive and transdisciplinary.

Prevention science is a rapidly expanding interdisciplinary field and this program will increase opportunities for the University's academic researchers to partner with communities to address the complex issues facing society.

Six areas of concentration will be offered. Students will be expected to select one as a major emphasis. Areas of concentration are: 1) promotion of mental health and well being across the life span; 2) interventions in education, health, and social services; 3) social policy; 4) family and community studies (early stage research, needs assessments, action research); 5) methodology; 6) individualized concentration.

For more information about these areas of concentration, visit https://www.cehd.umn.edu/fsos/programs/phd/prev-sci-minor.html

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must have gained admission to a doctoral degree-granting program, and have prepared a minor program of coursework approved by the director of graduate studies in prevention science. Students are required to make formal application to the program. Doctoral students must apply prior to submitting their graduate degree program in the Graduate Planner and Audit System (GPAS) for approval. Instructions and form can be found at https://www.cehd.umn.edu/fsos/programs/phd/prev-sci-minor.html

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The doctoral minor is developed in consultation with, and should be approved in advance by, the director of graduate studies for prevention science.
The purpose of the minor is to provide students with interdisciplinary training in prevention science; therefore, all students will be required to fulfill the elective requirements for the minor by taking courses outside their major. Courses counting toward a student's major may not be counted toward the minor. All minor coursework must be taken A-F and completed with a GPA of at least 3.0.

**Required Courses**

- PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
  - or FSOS 5701 - Prevention Science: Principles and Practices (3.0 cr)
- PREV 8002 - Prevention Science Research Methodology (3.0 cr)
  - or FSOS 5702 - Prevention Science Research Methodology (3.0 cr)
- PREV 8003 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)
  - or FSOS 5703 - New Topics in Prevention: Implementation and Dissemination (3.0 cr)

**ELECTIVE**

- Elective course from area of concentration (3.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Doctoral**
Twin Cities Campus

Private College Leadership Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development
University of Minnesota--Twin Cities
206 Burton Hall, 178 Pillsbury Dr. S.E.,
Univ of Minnesota, Minneapolis Mn, 55455
612-624-1006
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/default.html

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• For now the courses will be based on the UM Twin Cities campus.
• Degree: Private College Leadership PBacc Cer

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Private College Leadership Certificate is not accepting new students at this time.

Created for professionals who are in faculty positions or beginning levels of college administration, this graduate-level certificate offers specific knowledge and skills related to organizational development, leadership, entrepreneurship, and decision-making necessary for leading independent colleges. The Emerging Leaders in Independent Colleges curriculum is designed for individuals who seek to move into leadership positions but do not have formal training related to leadership and management of independent colleges.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited institution. The Private College Leadership Certificate is not accepting new students at this time.

Other requirements to be completed before admission:
Two years of experience in a professional position in higher education.

Special Application Requirements:
The Private College Leadership Certificate is not accepting new students at this time.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

The Private College Leadership Certificate is not accepting new students at this time.

Course List
Additional courses should be selected in consultation with the faculty advisor and the director of graduate studies to meet the minimum credit requirements. Take exactly 4 course(s) totaling exactly 12 credit(s) from the following:

- OLPD 5002 - Private Colleges as Formal Organizations (3.0 cr)
- OLPD 5902 - Leading Change in Private Colleges (3.0 cr)
Twin Cities Campus
Professional Development Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. S.E., Minneapolis, MN 55455
(612-626-8647; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12 to 15
- This program does not require summer semesters for timely completion.
- Degree: Professional Development PBacc Certificate Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in professional development is designed to prepare leaders in designing, implementing, and evaluating learning opportunities for preK-12 educators and related staff.

This 12- to 15-credit graduate-level program offers professional development opportunities for teachers, administrators, and others involved in school improvement initiatives. Throughout the program, students are required to reflect on their learning, make explicit connections between theory and practice, and design staff development processes and materials for use in their own work contexts.

Through the program, participants will:
- Learn to apply research-based standards for staff development,
- Be prepared for the multifaceted roles and competencies of staff developers,
- Identify organizational and leadership capacities for effective staff development policies and practices,
- Be able to articulate effective staff learning principles, designs, and strategies,
- Evaluate staff development, including its effects on students, staff, and systems,
- Learn to work effectively with groups, including both facilitation and training models of learning,
- Identify and access staff development resources, including current research and best practices literature,
- Gain awareness of individual strengths and areas for continuous improvement as a professional educator and leader of staff learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
Admission to the professional development certificate is open to both degree-seeking or non-degree seeking students. Students may pursue the certificate alone or concurrently with a UM masters or doctoral degree. Applicants must have at least three years of experience working as education or related professionals in preK-12 education. Please note that this program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States. Admission for this program is done on a rolling basis.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
Required Courses
- OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
- OLPD 5374 - Leadership for Professional Development (4.0 cr)
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Additional Coursework
With certificate coordinator approval, students choose and complete 2-5 credits of coursework focusing on a topic that interests them. Students can complete this requirement in one of two ways.

- Independently designed study or project [OLPD 5095]
- Focused elective coursework

Take 2 - 5 credit(s) from the following:

**Independently designed study or project: OLPD 5095**
OLPD 5095 Problems: OLPD (1-3 cr). Students submit a proposal for an independently designed study or project to the certificate coordinator for approval by submitting the Proposal for Independent Study or Project as Elective Option [PDF].
Examples of independently designed studies or projects include:
- Comprehensive site-level design for staff development, including learning, implementation, and evaluation components.

**Independently designed study or project: OLPD 5095 Cont’d**
- Evaluation of a current staff development or curricular initiative
- Internship focused on staff development research, policy, or practice with personnel in school districts, state departments, or higher education
- Individualized study or research review of a staff development-related topic
- Attendance at a national conference with documentation, reflection on learning, and specified follow-up application

**Focused elective coursework**
In consultation with the certificate coordinator, students can choose elective coursework that aligns with individual interests and best practices in the staff development field. Students may choose from the wide range of offerings at the University of Minnesota, including coursework with the following course designators:
- Curriculum and Instruction (CI)
- Educational Psychology (EPSY)
- Organizational Leadership, Policy, and Development (OLPD)
- Public Affairs (PA)
- Sociology (SOC)

**Please Note:**
The certificate coordinator must approve elective coursework. Courses taken before formal admission into the program may be accepted as program credits at a later date. Relevant graduate coursework from other graduate institutions may be approved to fulfill the elective requirement after review of relevant course syllabi. However, all coursework must have been taken within five years from the date of acceptance into the certificate program.
Twin Cities Campus
Program Evaluation Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 178 Pillsbury Dr S E, Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 15
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Program evaluation is an area of inquiry that uses both quantitative and qualitative methods to address questions of concern to policy makers, administrators, managers, and, in some cases, program participants. In this era of competing developments--increased accountability and the democratization of research activity--knowledge of program evaluation is a useful and valuable commodity. The program evaluation minor is an interdisciplinary effort providing intensive study of the techniques and process of evaluation and policy research, in addition to the social and political context within which program evaluation occurs. The graduate minor in program evaluation offers a coordinated set of courses designed for students who wish to have the knowledge and skills necessary to conduct evaluations combined with their graduate majors or professional fields of study. Courses include readings, discussions, and assignments designed to develop the skills essential to professionals intending to use or conduct evaluation in nonprofit and for-profit organizations.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Evaluation Studies Program Coordinator for graduate studies regarding feasibility and requirements.

Students pursuing Organizational, Leadership, Policy and Development or Educational Psychology degrees with evaluation-related concentrations are not eligible for the Program Evaluation minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for minor field coursework is 3.00.

Required Coursework (6 credits)
Take the following courses. Take OLPD 8596 for 3 credits. A different course can be substituted for OLPD 5501 with approval of the Evaluation Studies Program Coordinator for graduate studies.
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Additional Course (3 credits)
Take the following course to complete the 9-credit minimum:
OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)

Doctoral
Required Courses (6 credits)
Select 1 of the following in consultation with the Evaluation Studies Program Coordinator for graduate studies. OLPD 5502 is recommended for students interested in evaluation practice; OLPD 8502 is recommended for students pursuing research-intensive or academic careers.
OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)
or
OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)
Take the following course for 3 credits:
OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)

Additional Coursework (3 credits)
Select additional credits to complete the 15-credit minimum. Approval by the Evaluation Studies Program Coordinator for graduate studies is required.
Twin Cities Campus
Program Evaluation Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12 to 13
- This program does not require summer semesters for timely completion.
- Degree: Program Evaluation Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program evaluation certificate program offers intensive study of processes and applied methods for evaluating programs and services in school, health, government, nonprofit agencies, and market research settings. This interdisciplinary program surveys program evaluation techniques, processes, and examines the social and political contexts of the studies. The program allows working professionals from a variety of disciplines to formalize their training in program evaluation by earning a certificate in this area. Demand for trained professionals in program evaluation has increased steadily to meet the reporting needs of funding agencies, policy makers, and program managers in the public and private sectors. Graduates of evaluation studies programs have found employment in county government, social service agencies, state departments, and research consulting firms and businesses.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A completed graduate-level degree, master of education (MEd) or master of arts (MA), in an appropriate content area, including education, social work, public health, or public policy.

Other requirements to be completed before admission:
Students must demonstrate relevant academic background, including research methodology and experience in a field in which program evaluation is practiced (e.g., public health, social work, or education). Admission will be based on an assessment of the applicant's advanced knowledge and level of professional experience in the field of program evaluation. Applications are reviewed on a rolling basis.

Special Application Requirements:
Enrollment in the certificate program will be limited to a maximum of 10 students per calendar year.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
8-9 credits required. The following courses (or equivalents approved by the certificate coordinator) are required.

- Foundations of evaluation
  Take 1 course from the following:
  OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)

**Evaluation theory**
- OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)

**Internship in evaluation**
- Only 3 credits of this course can count towards this certificate.
- OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

**Elective Coursework**
Students may choose 3-4 credits of elective coursework from the following list to meet the overall program minimum of 12 credits. Additional courses may be approved by the certificate coordinator.

Take 3 or more credit(s) from the following:
- CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- CI 8914 - Critical Science Research (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
- OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
**Twin Cities Campus**
**Social Work M.S.W.**
*School of Social Work*
*College of Education and Human Development*

Link to a list of faculty for this program.

**Contact Information:**
School of Social Work  
105 Peters Hall  
1404 Gortner Avenue  
St. Paul, MN  55108  
612-625-1220  
Email: sswadmin@umn.edu  
Website: [https://www.cehd.umn.edu/ssw/graduate/master-of-social-work/](https://www.cehd.umn.edu/ssw/graduate/master-of-social-work/)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34 to 53
- This program does not require summer semesters for timely completion.
- Degree: Master of Social Work

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MSW prepares students for advanced social work practice. A 53 credit program and a 34 credit advanced standing program are available. The curriculum offers specializations in clinical mental health; community practice; families and children; and health, disabilities and aging.

**Accreditation**
This program is accredited by Council on Social Work Education

**Program Delivery**
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
An undergraduate degree with liberal arts background that includes course work in history and social sciences, the humanities and the arts, physical and biological sciences, and mathematics.

Other requirements to be completed before admission:  
One year of work experience in human services that has provided the applicant with opportunities to gain skills used in direct work with clients. Work experience may include paid, volunteer, and intern positions.

Please see the School of Social Work website for more information.

**Special Application Requirements:**
Applicants are required to submit a specified personal statement, writing sample, resume, transcripts, and three letters of recommendation. Applicants to the advanced standing MSW program who do not have at least one year of post-BSW full-time practice must submit the following as part of their application:

- BSW practicum evaluation OR
- Letter of reference from BSW practicum supervisor OR
- Letter of reference from BSW Field Faculty OR
- Letter of explanation as to why one of the above cannot be submitted

Important information for advanced standing applicants who choose the clinical mental health specialization:  
The advanced standing curriculum is designed to be completed in three semesters (summer-fall-spring or fall-spring-summer). Advanced standing students in the clinical mental health specialization (CMH) have the option to start the program in summer, depending on when they want to complete the MSW field practicum.
- Advanced standing CMH students who want to do their field practicum during the fall and spring semesters must start taking classes in the summer semester so they can complete the pre-requisites for field. They should plan to complete about six to seven credits in the summer session. (Summer-fall-spring)

- Advanced standing CMH students who want to do a summer field practicum can begin taking classes in either the summer or the fall semester. Their final semester will be summer field practicum of 9 credits. (Fall-spring-summer)

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C:
Plan C requires 34 to 53 major credits and up to null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The MSW requires 53 credits; a 34 credit advanced standing program is available to graduates of undergraduate social work programs accredited by the Council on Social Work Education. All credits for the MSW can be completed in two years of full-time study, or three years to four years of part-time study, and must be completed within five years of the date of the earliest coursework taken for the degree.

The 53 credit program includes a set of required foundation courses (19 cr), courses from a selected specialization, two field internships, and social work electives.

A maximum of 21 credits may be transferred from the following sources with School of Social Work approval: up to 8 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota; up to 21 credits from another regionally and professionally accredited school of social work if the student was registered as a graduate student in the program.

The 34 credit advanced standing program includes courses from a selected specialization, one field internship, and social work electives. A maximum of 13 credits may be transferred from the following sources with School of Social Work approval: 13 credits completed as a graduate student in another accredited MSW program; up to 6 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota.

Foundation Curriculum for Full Program Students

The 19 cr foundation curriculum is required for full program students. The foundation curriculum is waived for advanced standing students, unless required in a student's conditions of admission. Advanced standing students who receive a grade of B- or less in a BSW class that is comparable to one of our foundation classes may be asked to repeat that content in our MSW program. Students should take 8010 for 3 cr in fall; 3 cr in spring or 6 cr in summer.

Take exactly 19 credit(s) from the following:
- SW 5051 - Human Behavior and the Social Environment (2.0 cr)
- SW 5101 - Historical Origins and Contemporary Policies in Social Welfare (3.0 cr)
- SW 8151 - Social Work Methods: Practice With Individuals and Systems (2.0 cr)
- SW 8152 - Social Work Practice Methods: Families and Groups (2.0 cr)
- SW 8153 - Social Work Practice Methods: Macro Practice and Organizations (2.0 cr)
- SW 8841 - Social Work Research Methods (2.0 cr)
- SW 8010 - Seminar: Field Practicum I (1.0 - 6.0 cr)

Specialization Areas

Clinical Mental Health Specialization
Prepares students for advanced clinical social work practice with children, adults and families across diverse settings and populations. Students learn contextually based approaches to mental health diagnostic assessment, treatment and practice evaluation, with a strong focus on client systems experiencing significant mental health risk.

Anchor and Boost
- SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)
- SW 8452 - Core Concepts in Clinical Social Work Practice (3.0 cr)

Specialization Electives
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
- SW 8352 - Intervention Methods with Families (3.0 cr)
• SW 8461 - Advanced Clinical Social Work Practice with Adults (3.0 cr)
• SW 8462 - Advanced Clinical Practice With Children and Adolescents (3.0 cr)
• SW 8463 - Practice Interventions with Persons Who Experience Serious Mental Illness (3.0 cr)

**Diversity**

SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

**Advanced Policy**

SW 8806 - Health and Mental Health Policy (3.0 cr)

or SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

2nd Focus Anchor

Students must choose one course from this list. Dual degree students may substitute a course from their other degree program with approval from the MSW program director.

SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)

or SW 8351 - Assessment and Engagement with Families and Children (3.0 cr)

or SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)

**Specialization Field Practicum and Seminar**

Students complete 6 credits of SW 8020. The credits are either split between fall and spring semesters, or 6 credits are taken during summer. Advanced Standing students take SW 8030.

Take exactly 6 credit(s) from the following:

• SW 8020 - Field Practicum II (1.0 - 6.0 cr)

**Advanced Research**

Students must complete 3 credits of SW 8842. The credits are split between fall and spring semesters, or 3 credits are taken during the summer. Dual degree program students may substitute PA 5311 or PUBH 6034. This course must be taken concurrently with SW 8020 or 8030.

Take exactly 3 credit(s) from the following:

• SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)

• PA 5311 - Program Evaluation (3.0 cr)

• PUBH 6034 - Evaluation I: Concepts (3.0 cr)

**Free Electives**

Students must complete at least 5 credits of 5000-level or 8000-level courses not used for another program requirement.

-OR-

**Community Practice Specialization**

Specialization of human service systems to mobilize groups for social change, and to serve as catalysts for sustainable development and social justice. Students are prepared to fill a variety of community practice roles—leaders, planners, policy advocates, community organizers, mediators, evaluators, and agency administrators in a range of settings.

**Anchor and Boost**

SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)

SW 8552 - Advanced Community Practice: Leadership, Planning, and Program Development (3.0 cr)

**Specialization Electives**

Take 2 or more course(s) totaling 6 or more credit(s) from the following:

• PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)

• SW 5562 - Global Social Work and Social Development (3.0 cr)

• SW 8563 - Advanced Policy Advocacy (3.0 cr)

**Diversity**

SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

**Advanced Policy**

SW 8804 - Child Welfare Policy (3.0 cr)

or SW 8805 - Aging and Disability Policy (3.0 cr)

or SW 8806 - Health and Mental Health Policy (3.0 cr)

or SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

2nd Focus Anchor

Students must choose one course from this list. Dual degree students may substitute a course from their other program with approval of the MSW Program Director.

SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)

or SW 8351 - Assessment and Engagement with Families and Children (3.0 cr)

or SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)

**Specialization Field Practicum and Seminar**

Students complete 6 credits of SW 8020. The credits are either split between fall and spring semesters, or 6 credits are taken during summer. Advanced Standing students take SW 8030.

Take exactly 6 credit(s) from the following:

• SW 8020 - Field Practicum II (1.0 - 6.0 cr)

**Advanced Research**

Students must complete 3 cr of SW 8843. The credits are either split during fall and spring semesters, or 3 credits are taken during the summer. Dual degree students may substitute PA 5311 or PUBH 6034.

Take 3 or more credit(s) from the following:

• SW 8843 - Social Work Program Evaluation (1.0 - 2.0 cr)
• PA 5311 - Program Evaluation (3.0 cr)
• PUBH 6034 - Evaluation I: Concepts (3.0 cr)

**Free Electives**
Students must complete at least 5 credits of 5000-level or 8000-level courses not used for another program requirement.

-OR-

**Families and Children Specialization**
Prepares students to work with families and children in a range of settings and organizations, as well as influence relevant organizational structures and policies. Students will be able to identify protective supports and develop interventions that mediate risk and promote resilience.

**Anchor and Boost**
SW 8351 - Assessment and Engagement with Families and Children (3.0 cr)
SW 8352 - Intervention Methods with Families (3.0 cr)

**Specialization Electives**
Students must take two courses (6 cr) from the list of specialization electives. Take 6 or more credit(s) from the following:
- SW 8361 - Identification and Assessment of Family Violence (3.0 cr)
- SW 8363 - Social Work in Child Welfare (3.0 cr)
- SW 8462 - Advanced Clinical Practice With Children and Adolescents (3.0 cr)

**Diversity**
SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

**Advanced Policy**
SW 8804 - Child Welfare Policy (3.0 cr)
or SW 8805 - Aging and Disability Policy (3.0 cr)
or SW 8806 - Health and Mental Health Policy (3.0 cr)
or SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

**2nd Focus Anchor**
Students must complete one course from this list. Dual degree students may substitute a course from their other degree program with approval from the MSW program director.
- SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
- SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)
- SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)

**Specialization Field Practicum and Seminar**
Students complete 6 credits of 8020. The credits are either split between fall and spring semesters or 6 credits are taken during summer. Advanced standing students take SW 8030.
Take exactly 6 credit(s) from the following:
- SW 8020 - Field Practicum II (1.0 - 6.0 cr)

**Advanced Research**
Students must complete 3 credits of SW 8842. The credits are split between fall and spring semesters, or all 3 credits are taken during summer. Dual degree program students may substitute PA 5311 or PUBH 6034. This course must be taken concurrently with SW 8020 or 8030.
Take exactly 3 credit(s) from the following:
- SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)
- PA 5311 - Program Evaluation (3.0 cr)
- PUBH 6034 - Evaluation I: Concepts (3.0 cr)

**Free Electives**
Students must take at least 5 credits of 5000-level or 8000-level courses not used for another program requirement.

-OR-

**Health, Disability and Aging Specialization**
Prepares students to work with people affected by distinct and interconnected issues related to health, disability and aging. Students are prepared to work in a variety of settings such as hospitals, primary care clinics, residential care facilities, hospice, community-based programs, and in policy and advocacy organizations.

**Anchor and Boost**
SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
SW 8261 - Advanced Social Work Practice in Health Care (3.0 cr)

**Specialization Electives**
Students must take two courses (6 cr) from this list. Take 6 or more credit(s) from the following:
- SW 8262 - Empowerment Practice With Persons With Disabilities (3.0 cr)
- SW 8263 - Essential Skills and Perspectives for Working with Older Adults (3.0 cr)
- SW 8463 - Practice Interventions with Persons Who Experience Serious Mental Illness (3.0 cr)

**Diversity**
SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

**Advanced Policy**
SW 8805 - Aging and Disability Policy (3.0 cr)
or SW 8806 - Health and Mental Health Policy (3.0 cr)
or SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

**2nd Focus Anchor**

Students should choose one course from this list. Dual degree students may substitute a course from their other degree program with approval from the MSW program director.

- SW 8351 - Assessment and Engagement with Families and Children (3.0 cr)
- or SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)
- or SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)

**Specialization Field Practicum and Seminar**

Students complete 6 credits of SW 8020. These credits are either split between fall and spring, or 6 credits are taken during summer.

Advanced Standing students will take SW 8030.

Take 6 or more credit(s) from the following:
- **SW 8020** - Field Practicum II (1.0 - 6.0 cr)

**Advanced Research**

Students must complete 3 credits of SW 8842. The credits are split between fall and spring, or all 3 credits are taken during summer.

Dual degree students may substitute PA 5311 or PUBH 6034.

This course must be taken concurrently with SW 8020 or 8030.

Take 3 or more credit(s) from the following:
- **SW 8842** - Advanced Social Work Evaluation (1.0 - 3.0 cr)
- **PA 5311** - Program Evaluation (3.0 cr)
- **PUBH 6034** - Evaluation I: Concepts (3.0 cr)

**Free Electives**

Students must complete at least 5 credits of 5000-level or 8000-level courses not used for another degree requirement.

**Joint- or Dual-degree Coursework:** Master of Social Work/Master of Public HealthMaster of Social Work/Master of Public PolicyMaster of Social Work/Master of Urban & Regional Planning

Student may take a total of 22 credits in common among the academic programs.
Twin Cities Campus
Social Work Ph.D.
School of Social Work
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Social Work
105 Peters Hall
1404 Gortner Avenue
St. Paul, MN  55108
(612-625-1220; fax: 612-624-3744)
Email: sswadmin@umn.edu
Website: https://www.cehd.umn.edu/ssw/graduate/phd-in-social-work/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in social work prepares students to provide intellectual leadership for the social work profession through advanced levels of scholarship, research, theory development, and policy analysis. Students are expected to acquire skill in research design and statistics and to develop a comprehensive knowledge of social work and social welfare history, theory, and policy.

The PhD program does not focus on the development of advanced skills for clinical practice. However, students gain knowledge of practice theory and research related to social work practice. Many graduates assume positions as university faculty. Consequently, the program offers opportunities for students to acquire skills in teaching and curriculum development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is required.

Special Application Requirements:
Priority application deadline is early January in the appropriate year. Final deadline is early March. Applications received by second deadline will be reviewed and applicants accepted on a space-available basis.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

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Information current as of November 07, 2022
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 to 32 credits are required in the major.
8 to 12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The PhD program emphasizes mastery of student and program determined objectives rather than an accumulation of course credits. Degree requirements vary according to the student's background and educational goals. A minimum of 40 credits plus 24 required thesis credits beyond the MSW are required. Required courses include core seminars in social work research, social welfare history, social welfare policy, and theory and model development; a teaching course; a supervised research practicum and practicum seminar (two-semester sequence); supporting program courses (12 credits of supporting program course work is required - eight credits must be taken outside of social work while four credits may be taken in social work); and statistics courses. Students must also have teaching experience in the School of Social Work while in the program. Students are expected to attend PhD Colloquia and research colloquia for all years of their participation in the program.

Required Courses
SW 8875, Research Practicum, must be taken two semesters for a total of four credits.
GRAD 8101 - Teaching in Higher Education (3.0 cr)
SW 8851 - Social Welfare History and Historical Research Methods (3.0 cr)
SW 8855 - Social Policy Formulation and Analysis (3.0 cr)
SW 8861 - Theory and Model Development in Social Work (3.0 cr)
SW 8871 - Social Work Research Seminar I (3.0 cr)
SW 8872 - Social Work Research Seminar II (3.0 cr)
SW 8875 - Research Practicum (2.0 cr)

Required Statistics Courses
6 credits of graduate level statistics coursework, as approved by the Program Director.

Supporting Program Coursework
Students must take 12 credits of supporting course work in consultation with their advisor. 8 credits must be taken outside of social work while 4 credits may be taken in social work.
Twin Cities Campus
Sociocultural Studies in Education Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 178 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The sociocultural studies in education (SCSE) minor (previously known as the social and philosophic studies of education minor) provides a multidisciplinary foundation for the study of social and cultural phenomena that shape educational ideologies and practices. The minor enables students to take courses from a variety of social science, humanities, and interdisciplinary fields in order to generate a particular perspective, lens, or optic that can illuminate problems or processes of interest to them.

The SCSE minor program is shaped to suit the particular needs and interests of the student at either the master's or doctoral level. Courses at either the 5xxx or 8xxx level are selected in consultation with an SCSE faculty member and approved by the SCSE director of graduate studies (DGS). Courses are generally of two types: those that explicitly draw upon a disciplinary or interdisciplinary perspective to examine educational processes (e.g. economics of education); and those that provide an in-depth exploration of a disciplinary or interdisciplinary perspective itself (e.g. contemporary political thought).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the SCSE minor is contingent upon prior admission to a University masters or doctoral degree-granting program. Interested students should consult with a SCSE faculty member to develop a proposed course of study, then formally declare the minor when they file their degree plan. Students who declare the minor are required to include a member of the SCSE faculty on their masters or doctoral committee. Students may apply to this minor throughout the year.

Special Application Requirements:
The director of graduate studies (DGS) of the SCSE minor must approve the applicant's proposed course of study by signing the student's degree program form in addition to the student's major DGS.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.
Masters

Minor Requirements
Master’s students complete at least 9 graduate credits from the list of approved courses below. These must include a minimum of 3 OLPD course credits and 3 credits from courses outside of OLPD (these courses may be within CEHD). Additional courses may be approved by SCSE faculty in consultation with the SCSE minor DGS.

OLPD Courses
Must take at least 3 credits from the list below.
OLPD 5041 - Sociology of Education (3.0 cr)
OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
OLPD 5128 - Anthropology of Education (3.0 cr)
OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
OLPD 5346 - Politics of Education (3.0 cr)
OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
OLPD 8103 - Comparative Education (3.0 cr)

Non-OLPD Courses
Must take at least 3 credits from the list below.
AFRO 5120 - Social and Intellectual Movements in the African Diaspora (3.0 cr)
AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
AMST 8288 - Working in the Global Economy: Readings (3.0 cr)
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8207 - Political and Social Anthropology (3.0 cr)
ANTH 8215 - Anthropology of Gender (3.0 cr)
CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
CI 5641 - Language, Culture, and Education (3.0 cr)
CI 8111 - Representations of Knowledge in Curriculum and Culture (1.0 - 3.0 cr)
CI 8461 - Sociocultural Theory, Education, and Literacy (3.0 cr)
COMM 5451W - Intercultural Communication Processes [WI] (3.0 cr)
CPSY 5251W - Social and Philosophical Foundations of Early Childhood Education [WI] (3.0 cr)
CSCL 5555 - Introduction to Semiotics (3.0 cr)
CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
GLOS 5403 - Human Rights Advocacy (3.0 cr)
GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
GWSS 8101 - Intellectual History of Feminism (3.0 cr)
GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
GWSS 8107 - Feminist Pedagogies (3.0 cr)
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)
HIST 5932 - The Production of Knowledge, Negociating the Past, and the Writing of African Histories (3.0 cr)
HIST 8239 - Readings in Gender, Race, Class, and/or Ethnicity in the United States (3.0 cr)
HIST 8630 - Seminar in World History (3.0 cr)
HIST 8961 - Research Seminar: Intellectual History (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
PA 5414 (Inactive) (3.0 cr)
PHIL 5601 - History of the Philosophy of Science (3.0 cr)
PHIL 8130 - Seminar: Epistemology (3.0 cr)
PHIL 8131 - Epistemology Survey (3.0 cr)
PHIL 8133 - Feminist Theories of Knowledge (3.0 cr)
POL 8101 - Introduction to Political Science (3.0 cr)
POL 8215 - Philosophy of Political Inquiry (3.0 cr)
POL 8225 - American Political Thought (3.0 cr)
POL 8235 - Democratic Theory (3.0 cr)
POL 8253 - Late Modern Political Thought (3.0 cr)
POL 8275 - Contemporary Political Thought (3.0 cr)
POL 8305 - Interest Groups and Social Movements (3.0 cr)
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
SOC 8731 - Sociology of Knowledge (3.0 cr)
Doctoral Minor Requirements

Doctoral students complete at least 12 graduate credits from the list of approved courses below. These must include a minimum of 6 OLPD course credits and 3 credits from courses outside of OLPD (these courses may be within CEHD).

OLPD Courses

Must take at least 6 credits from the list below.

- OLPD 5041 - Sociology of Education (3.0 cr)
- OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5107 - Gender, Education, and International Development (3.0 cr)
- OLPD 5128 - Anthropology of Education (3.0 cr)
- OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
- OLPD 5346 - Politics of Education (3.0 cr)
- OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
- OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
- OLPD 8103 - Comparative Education (3.0 cr)

Non-OLPD Courses

Must take at least 3 credits from the list below.

- AFRO 5103 - World History and Africa (3.0 cr)
- AFRO 5120 - Social and Intellectual Movements in the African Diaspora (3.0 cr)
- AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
- AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
- AMST 8288 - Working in the Global Economy: Readings (3.0 cr)
- ANTH 8001 - Ethnography, Theory, History (3.0 cr)
- ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
- ANTH 8207 - Political and Social Anthropology (3.0 cr)
- ANTH 8215 - Anthropology of Gender (3.0 cr)
- CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 8111 - Representations of Knowledge in Curriculum and Culture (1.0 - 3.0 cr)
- CI 8461 - Sociocultural Theory, Education, and Literacy (3.0 cr)
- COMM 5451W - Intercultural Communication Processes [WI] (3.0 cr)
- CPSY 5251W - Social and Philosophical Foundations of Early Childhood Education [WI] (3.0 cr)
- CSL 5555 - Introduction to Semiotics (3.0 cr)
- CSCL 5823 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
- DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
- DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
- EPSY 5157 - Social & Developmental Psychology of Education (3.0 cr)
- GLOS 5403 - Human Rights Advocacy (3.0 cr)
- GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
- GWSS 8101 - Intellectual History of Feminism (3.0 cr)
- GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
- GWSS 8107 - Feminist Pedagogies (3.0 cr)
- GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
- GWSS 8109 - Feminist Knowledge Production (3.0 cr)
- GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
- HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
- HIST 8239 - Readings in Gender, Race, Class, and/or Ethnicity in the United States (3.0 cr)
- HIST 8630 - Seminar in World History (3.0 cr)
- HIST 8961 - Research Seminar: Intellectual History (3.0 cr)
- KIN 5371 - Sport and Society (3.0 cr)
- PA 5414 - Inactive (3.0 cr)
- PHIL 5601 - History of the Philosophy of Science (3.0 cr)
- PHIL 8130 - Seminar: Epistemology (3.0 cr)
- PHIL 8131 - Epistemology Survey (3.0 cr)
- PHIL 8133 - Feminist Theories of Knowledge (3.0 cr)
- POL 8101 - Introduction to Political Science (3.0 cr)
- POL 8215 - Philosophy of Political Inquiry (3.0 cr)
- POL 8225 - American Political Thought (3.0 cr)
- POL 8235 - Democratic Theory (3.0 cr)
- POL 8253 - Late Modern Political Thought (3.0 cr)
- POL 8275 - Contemporary Political Thought (3.0 cr)
- POL 8305 - Interest Groups and Social Movements (3.0 cr)
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
SOC 8731 - Sociology of Knowledge (3.0 cr)
SOC 8735 - Sociology of Culture (3.0 cr)
SW 5101 - Historical Origins and Contemporary Policies in Social Welfare (3.0 cr)
Twin Cities Campus
Special Education Initial License M.Ed.
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083)
Email: sped-adm@umn.edu
Website: https://www.cehd.umn.edu/edpsych/academics/specialed/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduates of the University's Special Education Initial License MEd are student-centered, collaborative professionals who deliver robust, high-quality, and specialized educational services, adding value to the learning and development of infants, children, and adults with disabilities from diverse cultural backgrounds.

Program graduates are knowledgeable in the following areas:
Engaging in collaborative problem solving with families and professionals to meet the academic, social, behavioral, and life skills needs of individuals with disabilities;
Implementing, and supporting others' implementation of, evidence-based instruction and intervention with fidelity to improve student outcomes;
Using reliable and valid assessment data to make individualized educational decisions;
Systematically selecting and adapting instructional supports to meet individual needs, based on data and knowledge of individual learning, developmental, and cultural differences;
Maximizing expectations and learning opportunities for individuals with disabilities in the Least Restrictive using the full continuum of services; and
Upholding principles of professionalism and ethics in their practice.

Accreditation
This program is accredited by PELSB, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Experience in working with children and/or people with disabilities is preferred.

Special Application Requirements:
The application deadline is March 1 for summer or fall admission.

Upload the following additional materials into the appropriate areas of the online application:
- One to two page applicant statement outlining goals, interests, experiences, etc.
- Résumé
- Two letters of recommendation [.pdf], preferably from individuals in the education field (for the online application, applicant's will be asked to enter recommenders' information into the online application; a message will be automatically sent to those recommenders with further instructions on how to submit their letters)
- Unofficial transcripts from all collegiate institutions attended (Students who are accepted will need to send official transcripts in a sealed envelope. University of Minnesota graduates need not submit University of Minnesota transcripts to Student Services.)
- International applicants should submit a foreign transcript evaluation from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp)

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations: TOEFL, IELTS, MELAB.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 30 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.

**Capstone Project:** A portfolio is required in conjunction with registration for EPSY 5699. The student and advisor will develop the individual's MEd graduate plan.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

**Academic Behavioral Strategist**
Additional requirements and credits will be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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**Required Courses (19 credits)**
Take the following courses:
- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

**Student Teaching (6 credits)**
Take the following for a total of 6 credits:
- EPSY 5741 - Student Teaching: Academic and Behavioral Strategist (3.0 - 6.0 cr)

**Pre-Student Teaching Field Experiences (3 credits)**
Take EPSY 5704 for 2 credits and EPSY 5705 for 1 credit.
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)

**Capstone Course (2 credits)**
Take the following course:
EPSY 5699 - Experimental Teaching Seminar (2.0 cr)

**Autism Spectrum Disorder**

Note: New student applications are not currently being accepted.

Additional requirements and credits will be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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**Required Courses (19 credits)**

Take the following courses:
- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

**Student Teaching (6 credits)**

Take the following course:
- EPSY 5742 - Student Teaching: Autism Spectrum Disorders (6.0 cr)

**Pre-Student Teaching Field Experiences (3 credits)**

Take EPSY 5704 for 1 credit and EPSY 5705 for 2 credits.
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)

**Capstone Course (2 credits)**

Take the following course:
- EPSY 5699 - Experimental Teaching Seminar (2.0 cr)

**Deaf and Hard of Hearing**

Additional requirements and credits will be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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**Required Courses (19 credits)**

Take the following courses:
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5641 - Foundations of Deaf Education (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5646 - Best Practices Teaching Reading and Writing for School Age: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5653 - ASL/English Structure and Application (3.0 cr)
- EPSY 5654 - Current Research, Issues Trends in Deaf Education (1.0 cr)

**Student Teaching (6 credits)**

Take 6 credits of the following:
- EPSY 5751 - Student Teaching for Deaf Education (1.0 - 6.0 cr)

**Pre-Student Teaching Field Experiences (3 credits)**

Take EPSY 5704 for 1 credit and EPSY 5705 for 2 credits.
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)

**Capstone Course (2 credits)**

Take the following course:
- EPSY 5699 - Experimental Teaching Seminar (2.0 cr)

**Developmental Disabilities**

Note: New student applications are not currently being accepted.
Required Courses (19 credits)
Take the following courses:
- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Student Teaching (6 credits)
Take each of the following courses for 3 credits:
- EPSY 5755 - Student Teaching: Developmental Disabilities, Mild/Moderate (1.0 - 6.0 cr)
- EPSY 5756 - Student Teaching: Developmental Disabilities, Moderate/Severe (1.0 - 6.0 cr)

Pre-Student Teaching Field Experiences (1-2 credits)
Take 1 to 2 credits of EPSY 5705 in consultation with the advisor.
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)

Electives (2 to 3 credits)
Select at least 2 credits from the following with the advisor:
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5622 - Programs and Curricula for Students with Developmental Disabilities (3.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take the following course:
- EPSY 5699 - Experimental Teaching Seminar (2.0 cr)

Early Childhood Special Education

Required Courses (19 credits)
Take the following courses:
- EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Student Teaching (6 credits)
Take each of the following courses for 3 credits:
- EPSY 5761 - Student Teaching in Early Childhood Special Education Settings for Children Aged Three to Five Years (3.0 cr)
- EPSY 5762 - Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years (3.0 cr)

Pre-Student Teaching Field Experiences (3 credits)
Take 3 credits of the following:
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)

Capstone Course (2 credits)
Take the following course:
- EPSY 5699 - Experimental Teaching Seminar (2.0 cr)

Learning Disabilities
Note: New student applications are not currently being accepted.
Additional requirements and credits will be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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Required Courses (19 credits)
Take the following courses:
- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Pre-Student Teaching Field Experiences (3 credits)
Take EPSY 5704 for 2 credits and EPSY 5705 for 1 credit.
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)

Electives (6 credits)
Select at least 6 credits from the following in consultation with the advisor:
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
- EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take the following course:
- EPSY 5699 - Experimental Teaching Seminar (2.0 cr)

Additional requirements and credits will be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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Required Courses (30 credits)
Take the following courses. Take EPSY 5991 for 3 credits.
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5637 - Core Practices in Special Education: Foundations of Special Education (1.0 cr)
- EPSY 5638 - Core Practices in Special Education: IEP Writing (1.0 cr)
- EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- EPSY 5699 - Experimental Teaching Seminar (2.0 cr)
- EPSY 5708 - Practicum in Moderate to Severe Emotional/Behavioral Disorders (2.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)
Twin Cities Campus
Special Education M.Ed.
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083)
Email: sped-adm@umn.edu
Website: https://www.cehd.umn.edu/edpsych/academics/specialed/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduates of the University's Special Education MEd program are student-centered, collaborative professionals who deliver robust, high-quality, and specialized educational services, adding value to the learning and development of infants, children, and adults with disabilities from diverse cultural backgrounds.

Program graduates are knowledgeable in the following areas:
- Engaging in collaborative problem solving with families and professionals to meet the academic, social, behavioral, and life skills needs of individuals with disabilities;
- Implementing, and supporting others' implementation of, evidence-based instruction and intervention with fidelity to improve student outcomes;
- Using reliable and valid assessment data to make individualized educational decisions;
- Systematically selecting and adapting instructional supports to meet individual needs, based on data and knowledge of individual learning, developmental, cultural differences;
- Maximizing expectations and learning opportunities for individuals with disabilities in the Least Restrictive using the full continuum of services; and
- Upholding principles of professionalism and ethics in their practice.

Accreditation
This program is accredited by PELSB, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Experience in working with children and/or people with disabilities is preferred.

Special Application Requirements:
The application deadline is March 1 for summer or fall admission.

Upload the following additional materials into the appropriate areas of the online application:
- One to two page applicant statement outlining goals, interests, experiences, etc.
- Résumé
- Two letters of recommendation [.pdf], preferably from individuals in the education field (for the online application, applicant’s will be asked to enter recommenders’ information into the online application; a message will be automatically sent to those recommenders with further instructions on how to submit their letters)
- Unofficial transcripts from all collegiate institutions attended (Students who are accepted will need to send official transcripts in a
sealed envelope. University of Minnesota graduates need not submit University of Minnesota transcripts to Office of Graduate Admissions.
- International applicants should submit a foreign transcript evaluation from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp)

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: A portfolio and integrated paper/mini research project/comprehensive exam is required in conjunction with registration for EPSY 5991. The student and advisor will develop the individual's MEd graduate plan.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Full Program: Students with a bachelor's degree from outside the University of Minnesota Special Education ABS BS program will complete a required program of core courses, electives, and a capstone course.

Students with a bachelor's degree from the University of Minnesota Special Education ABS BS program or with a Minnesota issued Tier 3 or 4 ABS license will complete a program of courses specific to their subplan designed with their academic adviser and a capstone course.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Academic Behavioral Strategist

Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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Required Courses (19 credits)

Take the following courses:

- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (9 credits)
Select at least 9 elective credits from the following in consultation with the advisor:

- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- EPSY 5641 - Foundations of Deaf Education (3.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5741 - Student Teaching: Academic and Behavioral Strategist (3.0 - 6.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

**Capstone Course (2 credits)**

Take EPSY 5991 for a minimum of 2 credits.

**EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)**

**Autism Spectrum Disorder**

Note: New student applications are not currently being accepted.

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**Courses for Full Program and Advanced Standing Anchor Programs**

**Full Program (30 credits)**

**Required Courses (19 credits)**

Take the following courses:

- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

**Electives (9 credits)**

Select at least 9 elective credits from the following in consultation with the advisor:

- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
- EPSY 5641 - Foundations of Deaf Education (3.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder (3.0 cr)
- EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions (3.0 cr)
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5742 - Student Teaching: Autism Spectrum Disorders (6.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

**Capstone Course (2 credits)**

Take EPSY 5991 for a minimum of 2 credits.

**EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)**

**-OR-**

**Advanced Standing Anchor Program (30 credits)**

**Electives (28 credits)**

Select 28 elective credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.

- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
- EPSY 5641 - Foundations of Deaf Education (3.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder (3.0 cr)
- EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions (3.0 cr)
EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
EPSY 5742 - Student Teaching: Autism Spectrum Disorders (6.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

**Capstone Course (2 credits)**
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

**Deaf and Hard of Hearing**
Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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**Required Courses (19 credits)**
Take the following courses:
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
- EPSY 5641 - Foundations of Deaf Education (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5646 - Best Practices Teaching Reading and Writing for School Age: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5653 - ASL/English Structure and Application (3.0 cr)
- EPSY 5654 - Current Research, Issues Trends in Deaf Education (1.0 cr)

**Electives (9 credits)**
Select at least 9 elective credits from the following in consultation with the advisor:
- EPSY 5642 - Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5643 - Seminar: Identity, Culture and Diversity in Deaf Education (2.0 cr)
- EPSY 5645 - Deaf Plus: Educating and Understanding Deaf Students with Disabilities (2.0 cr)
- EPSY 5647 - Spoken Language Practices and Assistive Technology: Deaf and Hard of Hearing (2.0 cr)
- EPSY 5651 - Best Practices Teaching Content Areas: Deaf Education (3.0 cr)
- EPSY 5652 - Incorporating Academic ASL in the Classroom: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
- EPSY 5751 - Student Teaching for Deaf Education (1.0 - 6.0 cr)
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5417 - Elementary Literacy Instruction for ESL Students (3.0 cr)
- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

**Capstone Course (2 credits)**
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

**Developmental Disabilities**
Note: New student applications are not currently being accepted.

Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

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**Courses for Full Program and Advanced Standing Anchor Programs**

**Full Program (30 credits)**

**Required Courses (19 credits)**
Take the following courses:
- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (9 credits)
Select at least 9 elective credits from the following in consultation with the advisor:
EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
EPSY 5622 - Programs and Curricula for Students with Developmental Disabilities (3.0 cr)
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
EPSY 5641 - Foundations of Deaf Education (3.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
EPSY 5706 - Practicum in Moderate to Severe Developmental Disabilities (2.0 cr)
EPSY 5755 - Student Teaching: Developmental Disabilities, Mild/Moderate (1.0 - 6.0 cr)
EPSY 5756 - Student Teaching: Developmental Disabilities, Moderate/Severe (1.0 - 6.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

-OR-

Advanced Standing Anchor Program (30 credits)
Electives (28 credits)
Select 28 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
EPSY 5622 - Programs and Curricula for Students with Developmental Disabilities (3.0 cr)
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
EPSY 5641 - Foundations of Deaf Education (3.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5706 - Practicum in Moderate to Severe Developmental Disabilities (2.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Early Childhood Special Education
Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

The University of Minnesota does not award licensure. The Professional Educator Licensing and Standards Board (PELSB) determines licensure for the state of Minnesota in the areas of teacher education and related services. For school administrative licensure, the Minnesota Board of School Administrators (BOSA) determines licensure in Minnesota.

Required Courses (19 credits)
Take the following courses:
EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
EPSY 5616W - Assessment and Due Process in Special Education [WI] (3.0 cr)
EPSY 5619W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (9 credits)
Select at least 9 elective credits from the following in consultation with the advisor:
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions (3.0 cr)
EPSY 5704 - Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms (1.0 - 2.0 cr)
EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
EPSY 5761 - Student Teaching in Early Childhood Special Education Settings for Children Aged Three to Five Years (3.0 cr)
EPSY 5762 - Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years (3.0 cr)
CPSY 5252 - Facilitating Social and Emotional Learning in Early Childhood Education (3.0 cr)
CPSY 5253 - Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)
CPSY 5254 - Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
Capstone Course (2 credits)
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Learning Disabilities
Note: New student applications are not currently being accepted.

Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

The University of Minnesota does not award licensure. The Professional Educator Licensing and Standards Board (PELSB) determines licensure for the state of Minnesota in the areas of teacher education and related services. For school administrative licensure, the Minnesota Board of School Administrators (BOSA) determines licensure in Minnesota.

Courses for Full Program and Advanced Standing Anchor Programs

Full Program (30 credits)
Required Courses (19 credits)
Take the following courses:
EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (9 credits)
Select at least 9 elective credits from the following in consultation with the advisor
EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
EPSY 5641 - Foundations of Deaf Education (3.0 cr)
EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
EPSY 5707 - Practicum in Moderate to Severe Learning Disabilities (3.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

-OR-

Advanced Standing Anchor Program (30 credits)
Electives (28 credits)
Select at least 28 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
EPSY 5641 - Foundations of Deaf Education (3.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5707 - Practicum in Moderate to Severe Learning Disabilities (3.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Emotional and Behavioral Disabilities
Note: New student applications are not currently being accepted.

Required Courses (19 credits)
Take the following courses:
EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
EPSY 5614W - Assessment and Due Process in Special Education [WI] (3.0 cr)
EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (9 credits)
Select at least 9 credits from the following in consultation with the advisor:
EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
EPSY 5705 - Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms (1.0 - 2.0 cr)
EPSY 5708 - Practicum in Moderate to Severe Emotional/Behavioral Disorders (2.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)

Capstone Course (2 credits)
Take EPSY 5991 for a minimum of 2 credits.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
Twin Cities Campus
Special Education Minor
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: sped-adm@umn.edu
Website: https://www.cehd.umn.edu/edpsych/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Special Education minor is a 12-credit program that provides a deeper understanding of special needs populations both inside and outside of teaching. Students will gain an understanding of the foundations of special education through a provision of special education services to children from birth through age 21. The field of special education as it relates to children of diverse backgrounds is infused throughout the coursework. Emphasis includes implementing evidence-based practices by examining students areas of strength and challenges and using data to determine effective academic, functional, and social-emotional treatment plans to ensure that persons with special needs meet their full potential. The Special Education minor is designed to meet the needs of students who are interested in working with children including those interested in elementary and secondary teaching, counseling, family social science, social work, occupational and physical therapy, mental health professionals, and those interested in neuroscience fields among others.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Special Education Coordinator regarding feasibility and requirements. Students with an Educational Psychology major may elect a minor in Special Education, but no courses may count for both the major and the minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All minor coursework must be taken on the A-F grade basis unless the course is only offered on the S/N grade basis, and the minimum cumulative GPA for that coursework is 3.0

Required Courses (8 credits)
Students with an Elementary Education major must take EPSY 5613.

Take the following courses:
- EPSY 5605W - Collaborative Practices for the Special Educator [WI] (3.0 cr)
- EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
Select either EPSY 5613 or EPSY 5015 and EPSY 5016, in consultation with the Special Education Coordinator.
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- or EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
**Elective Courses**
Select courses from the following, in consultation with the Special Education Coordinator, to complete the minimum credit requirement:

- **EPSY 5121** - Debugging Failure in Learning (3.0 cr)
- **EPSY 5609** - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
- **EPSY 5614W** - Assessment and Due Process in Special Education [WI] (3.0 cr)
- **EPSY 5617** - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- **EPSY 5631** - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- **EPSY 5641** - Foundations of Deaf Education (3.0 cr)
- **EPSY 5657** - Interventions for Behavioral Problems in School Settings (3.0 cr)
- **EPSY 5661** - Introduction to Autism Spectrum Disorder (3.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Masters**
Twin Cities Campus

Specialist in Education and General Education Administration Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Genl Educ/Admin

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applications to this certificate currently are not being accepted.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the MA and PhD programs choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and Human Resource Development (HRD). Our undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Applications to this certificate currently are not being accepted.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

This program's structure is currently under review. In the past, it has been customized based on the student's prior coursework. A final paper is required for completion.
Twin Cities Campus
Sport and Exercise Science M.Ed.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Email: kin@umn.edu
Website: https://www.cehd.umn.edu/kin/academics/grad/med-ses.html

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The sport and exercise science MEd is a practitioner-oriented, graduate-level program designed to prepare students for advanced study or careers in the coaching of sport, sport or physical performance, or professions related to health and physical activity. Students may focus their studies on one of three career tracks: sports performance, sports medicine, and health promotion.

With guidance from faculty advisors, students choose at least 30-semester credits, which may include coursework, independent study, internships, workshops, and professional, site-based experiences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

A bachelor's degree, preferably in kinesiology or physical education.

Special Application Requirements:
The department reviews applications on an ongoing basis. Application reviews for specific academic terms begin by the following dates:

- November 1: spring semester admission
- March 1: summer session admission
- July 1: fall semester admission (priority deadline May 1)

Admission requirements for this program include the following criteria:

A bachelor's degree, preferably in physical education or kinesiology, with a 2.50 minimum grade point average (GPA) from an accredited institution. Applicants who do not hold a degree in physical education or kinesiology may need to take some undergraduate prerequisite courses after admission.

All applicants must submit the following items:
- Online application
- Application fee
- Unofficial transcripts of all previous post-secondary academic study must be uploaded to the application (official transcripts will be required if accepted)
- Personal statement describing career goals and rationale for interest in the program
- Diversity statement
- Resume

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 20 major credits and 10 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: See the department for more details.
http://www.cehd.umn.edu/kin/academics/grad/professional/kin5995.html

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses

Students must consult with their advisor to determine their appropriate coursework. Students register for 3 credits of KIN 5995 and must consult with their advisor before registering for the course.

Research Method Course

Can choose to take either KIN 5181 or KIN 5441 to fulfill this requirement.

KIN 5181 - Understanding Kinesiology Research (3.0 cr)
or
KIN 5441 - Applied Sport Science Research (3.0 cr)

Final Capstone Project

Credits taken should be consulted with the MEd Director.

KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)

Elective Courses

Students choose the following electives based on one of the three career tracks below. A maximum of 9 credits of 4xxx courses may count towards the 30 credits required for the MEd degree.

Sports Performance

Examples of careers in this area include sports coach, exercise physiologist, sport analyst, personal trainer, group fitness instructor, strength and conditioning staff, sports training facility manager, team conditioning coach.

KIN 4385 - Exercise Physiology (4.0 cr)
KIN 4641 - Training Theory & Analytics I for Exercise & Sport Performance (3.0 cr)
KIN 4687 - Principles and Theory of Sports Coaching (3.0 cr)
KIN 4741 - Training Theory & Analytics 2 for Sport Performance (3.0 cr)
KIN 5104 - Physical Activities for Persons with Disabilities (3.0 cr)
KIN 5122 - Applied Exercise Physiology (3.0 cr)
KIN 5136 - Psychology of Coaching (3.0 cr)
KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
KIN 5328 - International Sport: The Impact of the Olympic Games [HIS, GP] (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
KIN 5435 - Advanced Theory and Techniques of Exercise Science (3.0 cr)
KIN 5485 - Exercise Testing and Prescription (3.0 cr)
KIN 5511 - Sport and Gender (3.0 cr)
KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
KIN 5641 - Scientific Theory and Application of Training and Conditioning in Sport (3.0 cr)
KIN 5696 - Practicum in Kinesiology (1.0 - 6.0 cr)
KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
KIN 5841 - Elite Performance and Environmental Considerations (3.0 cr)
KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
KIN 8285 - Cellular and Molecular Exercise Physiology (3.0 cr)
PHSL 5444 - Muscle (3.0 cr)

or Sports Medicine
Examples of careers in this area include athletic trainer, sports therapist, massage therapist, clinical support staff, kinesiotherapist, health fitness specialist.
KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
KIN 4441 - Movement Neuroscience (3.0 cr)
KIN 5104 - Physical Activities for Persons with Disabilities (3.0 cr)
KIN 5122 - Applied Exercise Physiology (3.0 cr)
KIN 5125 - Advances in Physical Activity and Health (3.0 cr)
KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
KIN 5255 - Advanced Biomechanics II: Kinetics (3.0 cr)
KIN 5441 - Applied Sport Science Research (3.0 cr)
KIN 5485 - Exercise Testing and Prescription (3.0 cr)
KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
KIN 5696 - Practicum in Kinesiology (1.0 - 6.0 cr)
KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
KIN 5841 - Elite Performance and Environmental Considerations (3.0 cr)
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
KIN 8132 - Seminar: Motor Development (3.0 cr)
KIN 8211 - Seminar: Perception and Action (3.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)

or Health Promotion
Examples of careers in this area include fitness center manager, fitness instructor, personal trainer, health educator, sports development officer.
KIN 4134 - The Aging Motor System (3.0 cr)
KIN 4214 - Health Promotion (3.0 cr)
KIN 5104 - Physical Activities for Persons with Disabilities (3.0 cr)
KIN 5122 - Applied Exercise Physiology (3.0 cr)
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
KIN 5125 - Advances in Physical Activity and Health (3.0 cr)
KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
KIN 5202 - Current Issues in Health (2.0 cr)
KIN 5328 - International Sport: The Impact of the Olympic Games [HiS, GP] (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
KIN 5441 - Applied Sport Science Research (3.0 cr)
KIN 5485 - Exercise Testing and Prescription (3.0 cr)
KIN 5511 - Sport and Gender (3.0 cr)
KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
KIN 5696 - Practicum in Kinesiology (1.0 - 6.0 cr)
KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
KIN 5804 - National Collegiate Athletic Association (NCAA) Compliance (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
Twin Cities Campus

Sport Management M. A.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue SE, Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: https://www.cehd.umn.edu/kin/academics/grad/ma-smgt.html

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 36
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of arts in sport management provides academic excellence by combining theoretical instruction and practical experience to prepare tomorrow's leaders for success in the sports industry and marketplace. Students develop the tools of research and learn core concepts through an interdisciplinary curriculum with an emphasis on cultivating new ideas and improving operations in the sport industry.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit a University of Minnesota application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) or the GMAT (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and unofficial transcripts. Submission of all application materials by December 1 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students are admitted for the fall semester.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4.5
• GMAT
  - Verbal section score: 33
  - Quantitative section score: 44
  - Analytical writing assessment score: 5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
Program Requirements

**Plan A:** Plan A requires 26 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 36 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is an independent research project with the advisor that meets the following guidelines: involves a total of approximately 120 hours of work; demonstrates familiarity with the tools of research and scholarship in the field of sport management; demonstrates the ability to work independently; demonstrates the ability to effectively present the results of the investigation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Core Coursework (16 Credits)**
Students in both plan A and B are required to take the following courses.
- KIN 5421 - Sport Finance (3.0 cr)
- KIN 5631 - Programming and Promotion in Sport (3.0 cr)
- KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
- KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
- KIN 5801 - Legal Aspects of Sport and Physical Activity (4.0 cr)

**Required Research Course (6 Credits)**
Students in both plan A and B are required to take at least 6 credits from one of the following courses or in consultation with your faculty advisor.
- CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- KIN 5981 - Research Methodology in Kinesiology and Sport Management (3.0 cr)

**Electives (4 to 10 Credits)**
Plan A students take at least 4 credits, and Plan B students take at least 10 credits from the following list or in consultation with the faculty advisor.
- KIN 5371 - Sport and Society (3.0 cr)
- KIN 5461 - Issues in the Sport Industry (3.0 cr)
- KIN 5511 - Sport and Gender (3.0 cr)
- KIN 5992 - Readings in Kinesiology (1.0 - 9.0 cr)
- KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)
- MKTG 6088 - Strategic Marketing (3.0 cr)

**Plan Options**

**Plan A**
Students must take at least 10 credits of KIN 8777.
Take 10 master's thesis credits.
- KIN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
- OR-

**Plan B**
Students must take at least 4 credits of KIN 8995.
Take KIN 8995 for 4 credits.
KIN 8995 - Research Problems in Kinesiology (1.0 - 12.0 cr)
Twin Cities Campus
Sport Management M.Ed.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

**Contact Information:**
Email: kin@umn.edu
Website: [https://www.cehd.umn.edu/kin/academics/grad/med-smgt.html](https://www.cehd.umn.edu/kin/academics/grad/med-smgt.html)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the [General Information](https://www.cehd.umn.edu/kin/academics/grad/med-smgt.html) section of the catalog website for requirements that apply to all major fields.

The sport management master of education (MEd) is a practitioner-oriented, graduate-level program designed to prepare students for advanced study or careers in sport administration, sport management, or sport and fitness related professions. With guidance from professional program advisers, students choose at least 30 semester credits, which may include coursework, independent study, internships, workshops, and professional site-based experiences. Required courses will provide students with a well-balanced perspective of the industry; multiple options in elective courses allow students to focus on topics they find applicable and interesting in relation to the sport and physical activity industry. Students must maintain a minimum 3.0 GPA.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 2.50.

A bachelor's degree, preferably in kinesiology or physical education.

**Special Application Requirements:**
The college reviews applications on an ongoing basis. Application reviews for specific academic terms begin by the following dates:
- November 1: spring semester admission
- March 1: summer session admission
- July 1: fall semester admission (priority deadline May 1)

Admission requirements for this program include the following criteria:

A bachelors degree, preferably in physical education or kinesiology, with a 2.50 minimum grade point average (GPA) from an accredited institution. Applicants who do not hold a degree in physical education or kinesiology may need to take some undergraduate prerequisite courses after admission.

All applicants must submit the following items:
- Online application
- Application fee ($75 for U.S. applicants; $95 for international applicants)
- Unofficial transcripts of all previous post-secondary academic study must be downloaded to the application (official transcripts will be required if accepted)
- Personal statement describing career goals and rationale for interest in the program
- Resume

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

**Plan C:** Plan C requires 22 major credits and 8 credits outside the major. There is no final exam. A capstone project is required. **Capstone Project:** Students work with teaching faculty on this final project. It is recommended that students complete the project during the final semester of the program.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

**Departmental Core Courses (22 credits)**

Take the following courses:

- **KIN 5421** - Sport Finance (3.0 cr)
- **KIN 5601** - Sport Management Ethics and Policy (3.0 cr)
- **KIN 5631** - Programming and Promotion in Sport (3.0 cr)
- **KIN 5725** - Organization and Management of Physical Education and Sport (3.0 cr)
- **KIN 5801** - Legal Aspects of Sport and Physical Activity (4.0 cr)
- **KIN 5995** - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)

Take either **KIN 5181** or **KIN 5981** in consultation with advisor.

- **KIN 5181** - Understanding Kinesiology Research (3.0 cr)
- **KIN 5981** - Research Methodology in Kinesiology and Sport Management (3.0 cr)

**Elective Courses (8 credits)**

Select 8 credits from the following list in consultation with the advisor. One course may be selected from outside kinesiology, such as from the Department of Organizational Leadership, Policy and Development, or Carlson School of Management.

- **KIN 5111** - Sports Facilities (3.0 cr)
- **KIN 5115** - Event Management in Sport (3.0 cr)
- **KIN 5371** - Sport and Society (3.0 cr)
- **KIN 5461** - Issues in the Sport Industry (3.0 cr)
- **KIN 5511** - Sport and Gender (3.0 cr)
- **KIN 5696** - Practicum in Kinesiology (1.0 - 6.0 cr)
- **KIN 5804** - National Collegiate Athletic Association (NCAA) Compliance (2.0 cr)
- **KIN 5992** - Readings in Kinesiology (1.0 - 9.0 cr)
- **PA 5101** - Management and Governance of Nonprofit Organizations (3.0 cr)
Twin Cities Campus

Sport Management Minor
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kine@umn.edu
Website: https://www.cehd.umn.edu/kin/academics/default.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sport management is an interdisciplinary field that provides students with academic training and field experience for careers in sport and fitness management professions. The sport management program encompasses many different subjects, including sociology, business, marketing, communications, and psychology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Take at least 6 sport management course credits, selected in consultation with the major advisor and the School of Kinesiology director of graduate studies, for the master's-level minor.

Doctoral
Take at least 12 sport management credits, selected in consultation with the major advisor and the School Kinesiology director of graduate studies, for the doctoral-level minor.
Twin Cities Campus
Talent Development and Gifted Education Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 56 East River Road, Minneapolis, MN 55455; 612-624-6083
Email: psyf-adm@umn.edu
Website: https://www.cehd.umn.edu/edpsych/programs-foundations/talent/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Talent Development/Gifted Education PBac Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This 12-credit certificate program is intended to give teachers, administrators, education professionals, and other individuals with an interest in the education of gifted and talented students the opportunity to obtain the knowledge and skills necessary to develop, implement, and supervise programs in the education of gifted and talented students.

Program Delivery
This program is available:
- Completely online (all program coursework can be completed online)

Prerequisites for Admission
Special Application Requirements:
Applicants to this post-baccalaureate certificate must have completed a bachelor's degree from an accredited institution. Student applications will be reviewed by William Bart, Ph.D., Program Coordinator, bartx001@umn.edu. Detailed application instructions are available at the website listed above. Applications are accepted for fall semester (March 1 deadline) and spring semester (October 15 deadline).

Applicants must submit the following application materials:
- Online application
- Unofficial transcripts from all post-secondary institutions attended or currently attending, including the University of Minnesota. (transcripts can be uploaded directly into the online application).
- For coursework completed outside of the United States, transcripts must be evaluated by a professional credential evaluation center. Request a “course-by-course” evaluation. This process can take 4-6 weeks; please plan accordingly. Students can use any provider that is an accredited member of the National Association of Credential Evaluation Services (NACES). A suggested provider is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400, fax: 414-289-3411).
- Applicant statement outlining interests and professional goals. The statement should minimally answer the following questions and be uploaded into the online application system: 1) Why are you interested in the talent development and gifted education certificate program? 2) What are your primary areas of interest related to talent development and gifted education?

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Courses (9 credits)
(EPSY 5991 must be taken for 3 credits)
EPSY 5101 - Intelligence and Creativity (3.0 cr)
EPSY 5116 - Education of the Gifted and Talented (3.0 cr)
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
Elective course (3 credits)
One course (minimum 3 credits) selected with the approval of the certificate program director. Examples include coursework in learning and cognition, social psychology of education, measurement, or coursework in another discipline such as curriculum and instruction, educational administration, child development, or psychology.
Twin Cities Campus
Teaching M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 55
- This program requires summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Education and Initial Teaching License curriculum earn you a master's degree and will train you to become a teacher in your field of choice. The master of education (MEd)/initial licensure programs are for individuals with bachelor's degrees who want to become teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted by Minnesota's Professional Licensing and Standards Board.

Accreditation
This program is accredited by Minnesota's Professional Education and Licensing Board

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Each track has a subset of prerequisite courses. Prerequisite information can be found at:
https://www.cehd.umn.edu/ci/admissions/ILP-admissions/prerequisites.html

A transcript review is recommended to be completed before applying in order to determine if an applicant is ready to apply or should continue to work on additional prerequisite coursework. Unofficial transcript(s) can be submitted for evaluation to the attention of the appropriate C&I MEd advisor. Adviser information is available with the current requirement and coursework link provided for each track.

Students with international coursework must arrange for a transcript evaluation from a foreign transcript evaluation service.

Submit the following materials using the University's online application system:
- Unofficial transcripts from all schools attended, even if a degree was not earned
- Resume
- Essay
- One letter of recommendation
- Extenuating circumstances statement (if applicable)

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 to 55 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: For specific language sub-plans only

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Arts in Education

This sub-plan is limited to students completing the program under Plan C.

The Arts in Education track is multidimensional, focusing on design and implementation of conceptually significant performing and visual arts education curricula grounded in current theory, knowledge of emerging technologies, understanding of equity-based practices in respective arts disciplines. Graduates of the program will be prepared to teach in diverse classrooms across a scope of K-12 learning environments.

The University of Minnesota does not award licensure. Minnesota's Professional Licensing and Standards Board determines licensure for the state of Minnesota for PreK-12 visual arts, dance, or theatre arts programs. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ce/academics/artsined/ILP-ArtsinEd.html] for current requirements and coursework.

Arts in Education (32 credits)

Summer Session (11 credits)
Take the following courses:
- CI 5049 - Digital Media & Technology Integration: Arts Education Theory & Practice (3.0 cr)
- CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
- CI 5102 - Culture, Schools, & Communities: Human Relations I (3.0 cr)
- CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
- CI 5617 - Academic Language and English Learners I (1.0 cr)
- EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

Fall Session (14 credits)
Take the following courses:
- CI 5065 - Improving Arts Programs in the Schools (3.0 cr)
- CI 5069 - Curriculum Innovations in Arts Education (3.0 cr)
- CI 5075 - The Social, Historical and Cultural Foundations of Arts Education (3.0 cr)
- CI 5103 - Culture, Schools, & Communities: Human Relations II (1.0 cr)
- CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
- CI 5618 - Academic Language and English Learners II (1.0 cr)

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Information current as of November 07, 2022
EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

Spring Session (4 credits)
Take each of the following courses for 2 credits:
CI 5008 - Theory and Practice of Arts Teaching (1.0 - 2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

MEd Completion Coursework (3 credits)
Take the following course for 3 credits:
CI 5050 - Issues in Art Education (1.0 - 4.0 cr)

Elementary
This sub-plan is limited to students completing the program under Plan C.

The Elementary Education track is designed to help students become inquiring, analytical, and reflective professional educators who can help students succeed in school. The program seeks to develop thoughtful practitioners who are engaged with children, communities, colleagues, and the field of education as advocates and leaders.

The University of Minnesota does not award licensure. Minnesota’s Professional Licensure and Standards Board determines licensure for the state of Minnesota in K-6 elementary teaching. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ci/academics/elementaryed/ILP-ElementaryEd.html] for current requirements and coursework.

Elementary Education sub-plans

Elementary Education (54.5 credits)
The 54.5-credit track is for students with a bachelor's degree other than the University of Minnesota Elementary Education Foundations degree.

May Session (6 credits)
Take the following courses:
CI 5111 - Introduction to Elementary School Teaching (3.0 cr)
EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)

Summer Session (9.5 credits)
Take the following courses:
CI 5307 - Technology for Teaching and Learning (1.5 cr)
CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
EPSY 5017 - Teaching Exceptional Students in General Education Classrooms (2.0 cr)
OLPD 5005 - School and Society (2.0 cr)
OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)

Fall Session (21 credits)
Take the following courses:
CI 5283 - Field Experience: Applying Instructional Methods in the Elementary Classroom (3.0 cr)
CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)

Spring Session (18 credits)
Take the following courses:
CI 5285 - Clinical Experience in Elementary School Teaching (12.0 cr)
CI 5286 - Student Teaching Seminar: Elementary Education (3.0 cr)
CI 5287 - Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools (3.0 cr)

-OR-

Elementary Education - U of M BS Degree Transitioners (39 credits)
The 39-credit track is for students with a University of Minnesota Elementary Education Foundations BS degree.

Fall Session (21 credits)
Take the following courses:
CI 5283 - Field Experience: Applying Instructional Methods in the Elementary Classroom (3.0 cr)
CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
CI 5645 - Teaching English Learners in English-medium classrooms (3.0 cr)
CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)

**Spring Session (18 credits)**

Take the following courses:

- CI 5285 - Clinical Experience in Elementary School Teaching (12.0 cr)
- CI 5286 - Student Teaching Seminar: Elementary Education (3.0 cr)
- CI 5287 - Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools (3.0 cr)

**English**

This sub-plan is limited to students completing the program under Plan C.

The English Education track is designed to develop inquiring, analytical, and reflective professional educators prepared to teach in the classroom. Our students explore the personal and political nature of reading, communication, language, and literacies. Instructors use critical literacy as a catalyst for examining how educational experiences are shaped by race, language, culture, identity, and codes of power.

The University of Minnesota does not award licensure. Minnesota's Professional Licensing and Standards Board determines licensure for the state of Minnesota in 5-12 middle and high school English education. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ci/academics/literacy/ILP-English.html](https://www.cehd.umn.edu/ci/academics/literacy/ILP-English.html) for current requirements and coursework.

**English Education (39.5 credits)**

**Summer Session (7.5 credits)**

Take the following courses:

- CI 5102 - Culture, Schools, & Communities: Human Relations I (3.0 cr)
- CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- CI 5617 - Academic Language and English Learners I (1.0 cr)
- EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

**Fall Session (14 credits)**

Take the following courses. Take CI 5441 for 3 credits.

- CI 5103 - Culture, Schools, & Communities: Human Relations II (1.0 cr)
- CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
- CI 5441 - Teaching Literature in the Secondary School (2.0 - 3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5471 - Clinical Experience in Teaching Secondary English (3.0 cr)
- CI 5618 - Academic Language and English Learners II (1.0 cr)
- EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

**Spring Session (6 credits)**

Take the following courses:

- CI 5461 - Teaching Composition in the Secondary School (3.0 cr)
- CI 5481 - Developments in Teaching English and Speech (3.0 cr)

**MEd Completion Coursework (12 credits)**

Select 12 credits from the following courses. If selected, take CI 5150 or 5410 for 3 credits. CI 5485 is recommended when CI 5484 is selected.

- CI 5150 - Curriculum Topics (1.0 - 4.0 cr)
- CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5442 - Adolescent Literature, Youth Activism and Climate Change Literacy (3.0 cr)
- CI 5464 - The Politics of Literacy and Race in Schools (3.0 cr)
- CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)
- CI 5484 - Improving Secondary English Language Arts Instruction: Part I (1.5 cr)
- CI 5485 - Improving Secondary English Language Arts Instruction: Part II (1.5 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)

**Mathematics**

This sub-plan is limited to students completing the program under Plan C.
The Mathematics Education track is designed to help future teachers inquire and reflect on how children learn and use this knowledge to design instructional experiences that challenge, engage, and empower. Candidates will work in a variety of school settings with experienced teachers to make connections between educational strategies discussed in coursework and students. Our graduates value an ethos of vulnerability, recognizing their knowledge and pedagogical skills as wide-ranging, ever-evolving, and in collaboration with their students.

The University of Minnesota does not award licensure. Minnesotas Professional Licensing and Standards Board determines licensure for the state of Minnesota in 5-12 middle and high school Math education. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ci/academics/mathed/ILP-MathEd.html] for current requirements and coursework.

Mathematics Education (34.5 credits)

**Summer Session (13.5 credits)**
- Take the following courses:
  - CI 5102 - Culture, Schools, & Communities: Human Relations I (3.0 cr)
  - CI 5307 - Technology for Teaching and Learning (1.5 cr)
  - CI 5617 - Academic Language and English Learners I (1.0 cr)
  - EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
  - EPSY 5017 - Teaching Exceptional Students in General Education Classrooms (2.0 cr)
  - MTHE 5011 - Arithmetic Structures in School Mathematics (3.0 cr)

**Fall Session (10 credits)**
- Take the following courses. Take CI 5452 for 2 credits.
  - CI 5103 - Culture, Schools, & Communities: Human Relations II (1.0 cr)
  - CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
  - CI 5618 - Academic Language and English Learners II (1.0 cr)
  - MTHE 5021 - Algebraic Structures in School Mathematics (3.0 cr)
  - MTHE 5115 - Applications of Teaching Mathematics (3.0 cr)

**Spring Session (3 credits)**
- Take the following course:
  - MTHE 5031 - Geometric Structures in School Mathematics (3.0 cr)

**MED Completion Coursework (8 credits)**
- Take the following courses:
  - MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
  - MTHE 5368 - Technology-Assisted Mathematics Instruction (3.0 cr)
- Select credits from the following, in consultation with the advisor, to complete minimum credit requirements.
  - MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
  - MTHE 5171 - Teaching Problem Solving (3.0 cr)
  - MTHE 5172 - Teaching Probability and Statistics (3.0 cr)
  - MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)
  - MTHE 5993 - Directed Studies in Mathematics Education (2.0 cr)

Science

This sub-plan is limited to students completing the program under Plan C.

Science teachers are in high demand. The Science track will prepare students to step into the classroom ready to begin teaching in diverse classrooms. The program offers a mix of theory and practice, to prepare teachers to provide equitable student-centered science instruction for all students.

The University of Minnesota does not award licensure. Minnesota's Professional Licensing and Standards Board determines licensure for the state of Minnesota in 9-12 high school and 5-8 general science education. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ci/academics/scienceed/ILP-Science.html] for current requirements and coursework.

Science Education (39.5 credits)

**Summer Session (12 credits)**
- Take the following courses:
  - CI 5102 - Culture, Schools, & Communities: Human Relations I (3.0 cr)
  - CI 5530 - Secondary Science Methods I (3.0 cr)
  - CI 5617 - Academic Language and English Learners I (1.0 cr)
EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
EPSY 5017 - Teaching Exceptional Students in General Education Classrooms (2.0 cr)

**Fall Session (15.5 credits)**
Take the following courses. Take CI 5452 for 2 credits.
- CI 5103 - Culture, Schools, & Communities: Human Relations II (1.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5531 - Secondary Science Methods II (3.0 cr)
- CI 5541 - Teaching History and Nature of Science (3.0 cr)
- CI 5596 - Clinical Experience in Middle School Science (4.0 cr)
- CI 5618 - Academic Language and English Learners II (1.0 cr)

**Spring Session (3 credits)**
Take the following course:
- CI 5532 - Secondary Science Methods III (3.0 cr)

**MEd Completion Coursework (9 credits)**
Select 9 credits from the following. If CI 5540 is selected it must be taken for 3 credits.
- CI 5533 - Current Developments in Science Teaching (3.0 cr)
- CI 5535 - Foundations of Science Education (3.0 cr)
- CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 4.0 cr)
- CI 5551 - Reflecting on Science Classroom Practices I (1.5 cr)
- CI 5552 - Reflecting on Science Classroom Practices II (1.5 cr)

**Second Language Education**
This sub-plan is limited to students completing the program under Plan C.

The Second Language Education track integrates the fields of world languages and English as a Second Language (ESL), enabling students studying in either field to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education. In addition to ESL, students can study one or more world/classical languages including Arabic, Chinese (Mandarin), French, German, Hebrew, Italian, Japanese, Norwegian, Ojibwe, Classical Greek and Latin, Russian, Spanish, and Swedish.

The University of Minnesota does not award licensure. Minnesota's Professional Licensing and Standards Board determines licensure for the state of Minnesota in K-12 second language education. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ci/academics/SLE/ILP-SLE.html](https://www.cehd.umn.edu/ci/academics/SLE/ILP-SLE.html) for current requirements and coursework.

**Second Language Education (33.5 credits)**

**Summer Session (14 credits)**
Take the following courses. Take CI 5452 and CI 5631 for 1 credit.
- CI 5102 - Culture, Schools, & Communities: Human Relations I (3.0 cr)
- CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
- CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- CI 5631 - Second Language Curriculum Development and Assessment (1.0 - 3.0 cr)
- EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- LING 5001 - Introduction to Linguistics (4.0 cr)

**Fall Session (12.5 credits)**
CI 5631 will be required again in Fall session, this time for 2 credits.
- CI 5103 - Culture, Schools, & Communities: Human Relations II (1.0 cr)
- CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)

**Spring Session (7 credits)**
Take the following courses:
- CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
Second Language Education for Working Professionals
This sub-plan is limited to students completing the program under Plan C.

The Second Language Education (SLE) for working professionals track is designed for practicing teachers in the areas of ESL and/or any of the following 14 languages: Arabic, Chinese (Mandarin), French, German, Hebrew, Italian, Japanese, Norwegian, Ojibwe, Classical Greek and Latin, Russian, Spanish, and Swedish. This part-time program provides educators with the specific knowledge base and skill set needed to be a K-12 teacher of ESL or a world language.

The University of Minnesota does not award licensure. Minnesota's Professional Licensing and Standards Board determines licensure for the state of Minnesota in ESL or a world/classical language license. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ce/academics/SLE/ILP-SLE-Working-Professionals.html] for current requirements and coursework.

ESL or World Languages

SLE Working Professionals - ESL (37.5 to 44.5 credits)
100 hours of experience in schools across elementary, middle and high school language classrooms which must be completed before practicum and student teaching.

M.Ed. Required Coursework (5.5 credits)
Take the following courses. Take CI 5452 for 1 credit.

- **CI 5307** - Technology for Teaching and Learning (1.5 cr)
- **CI 5452** - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- **OLPD 5005** - School and Society (2.0 cr)
- **OLPD 5009** - Human Relations: Applied Skills for School and Society (1.0 cr)

Special Education Focus (2 credits)
Select EPSY 5017 or both EPSY 5015 and EPSY 5016 to complete the 2-credit requirement.

- **EPSY 5015** - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- **EPSY 5016** - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- **EPSY 5017** - Teaching Exceptional Students in General Education Classrooms (2.0 cr)

Psychology Focus (3 to 6 credits)
Select EPSY 5001 and CPSY 5301 for a total of 6 credits, or CI 5163 and 5164 for a total of 3 credits.

- **CI 5163** - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
- **CI 5164** - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
- **CPSY 5301** - Advanced Developmental Psychology (3.0 cr)
- **EPSY 5001** - Learning, Cognition, and Assessment (3.0 cr)

Additional Required Experiences/Coursework (27 to 31 credits)
Take the following courses. The number of credits required for CI 5697 will be dependent upon the current teaching position.

- **CI 5620** - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- **CI 5642** - Assessing English Learners (3.0 cr)
- **CI 5646** - English Grammar for ESL Teachers (3.0 cr)
- **CI 5651** - Foundations of Second Languages and Cultures Education (3.0 cr)
- **CI 5656** - Teaching Literacy in Second Language Classrooms (3.0 cr)
- **CI 5657** - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- **CI 5662** - Second Language Curriculum Design (3.0 cr)
- **CI 5679** - Additional Licensure Field Experience: Teaching ESL and World Languages (2.0 - 6.0 cr)
- **LING 5001** - Introduction to Linguistics (4.0 cr)

-OR-

SLE Working Professionals - World Languages (33.5 to 39.5 credits)

M.Ed. Required Coursework (5.5 credits)
Take the following courses. Take CI 5452 for 1 credit.

- **CI 5307** - Technology for Teaching and Learning (1.5 cr)
- **CI 5452** - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- **OLPD 5005** - School and Society (2.0 cr)
- **OLPD 5009** - Human Relations: Applied Skills for School and Society (1.0 cr)

Special Education Focus (2 credits)
Select EPSY 5017 or both EPSY 5015 and EPSY 5016 to complete the 2-credit requirement.

- **EPSY 5015** - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- **EPSY 5016** - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- **EPSY 5017** - Teaching Exceptional Students in General Education Classrooms (2.0 cr)

Psychology Focus (3 to 6 credits)
Select EPSY 5001 and CPSY 5301 for a total of 6 credits, or CI 5163 and 5164 for a total of 3 credits.

- **CI 5163** - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)

Additional Required Experiences/Coursework (23 to 26 credits)
Take the following courses. The number of credits required for CI 5696 will be dependent upon current teaching position.
CI 5619 - Teaching World Languages and Cultures in Elementary Settings (2.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5696 - Initial Licensure Field experience: Teaching ESL and World Languages (2.0 - 6.0 cr)
CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
or CI 5662 - Second Language Curriculum Design (3.0 cr)
If CI 5660 Special Topics is selected, take STARTALK for Mandarin Chinese for 2 credits.
CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
or CI 5641 - Language, Culture, and Education (3.0 cr)
or CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
CI 5625 - Assessing Language Learners' Communication Skills via Authentic Communicative Performance Tasks (2.0 cr)
or CI 5658 - Language Testing and Assessment (3.0 cr)

Social Studies
This sub-plan is limited to students completing the program under Plan C.

The Social Studies track is designed to foster a community of support for all students in the program. Through a lens of social justice education, students will join a diverse cohort of candidates who want to study pedagogy and educational approaches as they relate to contemporary social studies instruction. You will be paired with experienced teachers to complete your field experience and will enter the classroom prepared to teach.

The University of Minnesota does not award licensure. Minnesota's Professional Licensing and Standards Board determines licensure for the state of Minnesota in 5-12 middle and high school Social Studies education. Upon satisfactory completion of coursework and program requirements, the Office of Teacher Education can recommend the student for state licensure. Required licensure coursework is subject to change. Please visit [https://www.cehd.umn.edu/ci/academics/socialstudies/ILP-socialstudies.html] for current requirements and coursework.

Social Studies Education (32.5 credits)

Summer Session (14 credits)
Take the following courses. Take CI 5452 for 2 credits.
CI 5102 - Culture, Schools, & Communities: Human Relations I (3.0 cr)
CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5617 - Academic Language and English Learners I (1.0 cr)
CI 5741 - Introduction to Social Studies Education (3.0 cr)
CI 5743 - The Social Sciences and the Social Studies (3.0 cr)
EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

Fall Session (12.5 credits)
Take the following courses:
CI 5103 - Culture, Schools, & Communities: Human Relations II (1.0 cr)
CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
CI 5307 - Technology for Teaching and Learning (1.5 cr)
CI 5618 - Academic Language and English Learners II (1.0 cr)
CI 5742 - Advanced Methods of Teaching the Social Studies (3.0 cr)
CI 5745 - Engaging Youth With Social Studies Texts (3.0 cr)
EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

Spring Session (3 credits)
Take the following course:
CI 5744 - Seminar: Reflecting on Professional Development in Social Studies Education (3.0 cr)

Elective (3 credits)
Select one of the following courses:
CI 5746 - Global and Multicultural Education in the Secondary Classroom (3.0 cr)
CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)

Alternative Pathway: Elementary Education
This sub-plan is limited to students completing the program under Plan C.
The Alternative Pathway: Elementary Education track requires 36 credits.

The University of Minnesota does not award licensure. Teaching licenses are granted by the Minnesota Professional Licensing Standards Board (PELSB). For more information on PELSB, please visit https://mn.gov/pelsb/. For the Minnesota Grow Your Own Teachers program, please visit https://www.cehd.umn.edu/teaching/grow/teacher/ for current licensure requirements and coursework.

For the Dual Language and Immersion Licensure program, please visit https://www.cehd.umn.edu/ci/academics/SLE/ILP-Dual-Language-Immersion.html for current licensure requirements and coursework.

Coursework (36 credits)
Take the following courses. Take 1 credit of CI 5980 four times for a total of 4 credits. Take CI 5452 for 1 credit. MNGOT students take CI 5186 two times for a total of 6 credits. DLI students take CI 5672 and CI 5676.

CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5211 - Elementary Education Content and Pedagogy I (4.0 cr)
CI 5212 - Elementary Education Content and Pedagogy II (3.0 cr)
CI 5213 - Elementary Education Content and Pedagogy III (3.0 cr)
CI 5214 - Elementary Education Content and Pedagogy IV (3.0 cr)
CI 5215 - Elementary Education Content and Pedagogy V (2.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)
CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)

Alternative Pathway: Secondary Mathematics
This sub-plan is limited to students completing the program under Plan C.

ALERT: the Teaching M.Ed.-Alt Pathway: Secondary Mathematics program is currently suspended. We are not accepting applications at this time.

The University of Minnesota does not award licensure. Teaching licenses are granted by the Minnesota Professional Licensing Standards Board (PELSB). For more information on PELSB, please visit https://mn.gov/pelsb/. For the Minnesota Grow Your Own Teachers program, please visit https://www.cehd.umn.edu/teaching/grow/teacher/ for current licensure requirements and coursework.

The Alternative Pathway: Secondary Mathematics track requires 36 credits.

Coursework (36 credits)
Take the following courses. Take 1 credit of CI 5980 4 times for a total of 4 credits. Take CI 5452 for 1 credit. Take CI 5186 2 times for a total of 6 credits. The remaining credits should be taken in consultation with your faculty adviser.

CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5511 - Introduction to Secondary Science: Laboratory-based Instruction (4.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)

Alternative Pathway: Secondary Science
This sub-plan is limited to students completing the program under Plan C.
Alert: The Teaching M.Ed.-Alt Pathway: Secondary Science program is currently suspended. We are not accepting applications at this time.

The University of Minnesota does not award licensure. Teaching licenses are granted by the Minnesota Professional Licensure Standards Board (PELSB). For more information on PELSB, please visit https://mn.gov/pelsb/. For the Minnesota Grow Your Own Teachers program, please visit https://www.cehd.umn.edu/teaching/grow/teacher/ for current licensure requirements and coursework.


Coursework (36 credits)
Take the following courses. Take 1 credit of CI 5980 4 times for a total of 4 credits. Take CI 5452 for 1 credit. Take CI 5186 two times for a total of 6 credits.

CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5511 - Introduction to Secondary Science: Laboratory-based Instruction (4.0 cr)
CI 5512 - Secondary Science Methods: Understanding the Nature of Science (3.0 cr)
CI 5513 - Secondary Science Methods: Equity in Science Teaching (3.0 cr)
CI 5514 - Secondary Science Methods: The Science Learning Environment (2.0 cr)
CI 5515 - Secondary Science Methods: Developing Adaptive Expertise (3.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)

Alternative Pathway: English as a Second Language
This sub-plan is limited to students completing the program under Plan C.

The University of Minnesota does not award licensure. Teaching licenses are granted by the Minnesota Professional Licensure Standards Board (PELSB). For more information on PELSB, please visit https://mn.gov/pelsb/. For the Minnesota Grow Your Own Teachers program, please visit https://www.cehd.umn.edu/teaching/grow/teacher/ for current licensure requirements and coursework.

The Alternative Pathway: English as a Second Language track requires 36 credits.

Coursework (36 credits)
Take the following courses. Take 1 credit of CI 5980 4 times for a total of 4 credits. Take CI 5452 for 1 credit. Take CI 5186 two times for a total of 6 credits.

CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5511 - Introduction to Secondary Science: Laboratory-based Instruction (4.0 cr)
CI 5512 - Secondary Science Methods: Understanding the Nature of Science (3.0 cr)
CI 5513 - Secondary Science Methods: Equity in Science Teaching (3.0 cr)
CI 5514 - Secondary Science Methods: The Science Learning Environment (2.0 cr)
CI 5515 - Secondary Science Methods: Developing Adaptive Expertise (3.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)

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Information current as of November 07, 2022
Twin Cities Campus
Teaching Writing and Critical Literacy Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Teaching, Writing & Critical Literacy PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in teaching writing and critical literacy prepares preK-college educators to strengthen their skills and knowledge of current practice and research in the teaching of critical reading and writing (note that a university certificate program or certificate is distinct from a state certificate or certification).

Writing and reading complement one another, and their interconnectedness is critical to literacy instruction. This certificate will offer advanced knowledge of the teaching of literacy through a focused, rigorous program while developing practicing educators' skills as teachers and writers in a supportive learning community.

Changing literacy needs of students from all socioeconomic and educational backgrounds demand highly qualified teachers of reading and writing at the K-12 and postsecondary levels. Educators must prepare K-12 students to meet testing requirements at the state and national levels. In addition, teachers must meet the increasing literacy needs that accompany Minnesota's changing demographics of growing immigrant and English language learner (ELL) populations. Educators also must prepare students to communicate effectively by using new technologies.

The certificate program seeks to accomplish the following goals:
- Develop effective strategies for teaching the writing process to English-language learners and diverse populations, as well as reading and writing across the curriculum.
- Engage educators in current research about composition, reading, and learning theory.
- Create learning communities where educators reflect on their own teaching, reading, and writing.
- Give educators opportunities to learn from other practicing educators.

This program begins with a three-week, 3-credit Minnesota Writing Project (MWP) Invitational Institute and then extends to allow educators to choose from a wider range of courses from multiple University departments throughout the academic year.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.

Applicants must be licensed teachers or administrators. Non-licensed teachers may be admitted with faculty letters of recommendation if program space is available.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, a goal statement that explains the relationship of courses and research to your professional goals, and two letters of recommendation addressing your teaching accomplishments and potential for further study.
Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (9 credits)

- CI 5463 - Minnesota Writing Project Annual Invitational Summer Institute (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)

Directed Study

3 credits of "directed study" will be taken in consultation with faculty adviser

Elective Courses (6 credits)

Take 2 or more course(s) totaling 6 or more credit(s) from the following:

- CI 5145 - Critical Pedagogy (3.0 cr)
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5442 - Adolescent Literature, Youth Activism and Climate Change Literacy (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
- LING 5001 - Introduction to Linguistics (4.0 cr)
- LING 5461 - Conversation Analysis (3.0 cr)
- LING 5900 - Topics in Linguistics (3.0 cr)
- WRIT 5531 - Introduction to Writing Theory and Pedagogies (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5646 - Best Practices Teaching Reading and Writing for School Age: Deaf and Hard of Hearing (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)

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Information current as of November 07, 2022
Twin Cities Campus
Work and Human Resource Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 206 Burton Hall, 178 Pillsbury Dr. SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Admission to the Work and Human Resource Education (WHRE) MED program is currently suspended.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. The department's research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the MA and PhD programs choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and human resource development (HRD). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Professional experience in a work and human resource education field or an undergraduate major in education with an appropriate content field.

Special Application Requirements:
Admission to the Work and Human Resource Education (WHRE) MED program are currently suspended.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 17 to 21 major credits and 9 to 13 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The work and human resource education (WHRE) MEd program is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Required Coursework

Two plans are offered:

Plan I is for licensed educators planning to pursue advanced professional study and requires a minimum of 17 semester credits of OLPD courses.

Plan II is for professionals seeking additional education and requires a minimum of 21 semester credits. Students must complete all Plan I requirements. However, the Plan II specialization area must include at least one methods of instruction course.

General Aspects

Specialization

8-12 credits of OLPD courses with advisor approval depending if Plan I or Plan II.

Research

OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Students electing Plan II must take an advisor approved methods of instruction course.

Electives

Up to 13 credits with advisor approval, a minimum of 6 credits must come from outside the OLPD department.

Integrating Project

Students work with their faculty advisor to select specialization courses consistent with their professional goals, select the course(s) to meet the general aspects requirement, and design and complete the integrating project. The proposed program must be reviewed and approved by departmental faculty.

OLPD 5893 - Directed Study in OLPD (1.0 - 4.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Comprehensive Work and Human Resource Education

This sub-plan is limited to students completing the program under Plan C.

All subplans in this major use same curriculum. The work and human resource education (WHRE) MEd program is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Rochester

This sub-plan is limited to students completing the program under Plan C.

Requirements for this sub-plan are the same as those listed in general description. Students may take courses on the Twin Cities or Rochester campuses. The work and human resource education (WHRE) MEd program is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.
Youth Development Leadership M.Ed.

**School of Social Work**

**College of Education and Human Development**

Link to a [list of faculty](#) for this program.

**Contact Information:**
School of Social Work, University of Minnesota, 182 Peters Hall, 1404 Gortner Avenue, St. Paul, MN 55108 (612-624-8785)
Email: rossvr@umn.edu
Website: [https://www.cehd.umn.edu/ssw/graduate/youth-development-leadership/](https://www.cehd.umn.edu/ssw/graduate/youth-development-leadership/)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- N/A
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Youth development leadership (YDL) understands leadership as a practice everyone does every day, regardless of age. You will be invited to reflect on your own leadership experiences within a learning community that includes fellow students, community practitioners, and faculty. You will learn about your own leadership, deepen your understanding of the young people you work with, and expand your connection within the larger youth work community both locally and globally. You will be invited to think critically about how communities often understand and respond to young people and work to create innovative interventions for young people in schools, community organizations, and the workplace that challenge these typical understandings and create opportunities for young people to fully flourish. How can we collaborate with young people when responding to the most pressing current issues and needs? What organizational structures and strategies support and sustain young people's authentic and meaningful involvement in inclusive, socially just, and equitable opportunities? How can organizations, schools, and communities transform to provide developmentally rich and meaningful opportunities for young people?

Utilizing the most current understanding of youth development joined to issues of inclusion, equity, and social justice, you will graduate with the necessary knowledge and skills to work collaboratively, think critically, and act intentionally to create sustainable opportunities for young people and the communities they live in.

The YDL M.Ed. emphasizes:
- A variety of theories and models in youth work, including critical youth work, community youth work and positive youth development;
- Experiential, interdisciplinary and collaborative learning models;
- Leadership and community building by encouraging consultation among faculty, professional youth workers, fellow students, and young people;
- Diverse, flexible, dialogic faculty that provide an informed understanding of practices, policies, and ethics of youth development work;
- A cohort model for supportive and challenging learning environments;
- A faculty committed to helping students develop a course of study that meets their professional and personal needs and interests.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited institution.

Other requirements to be completed before admission:
- At least two years of experience working with youth.

**Special Application Requirements:**

All applicants must upload the following items to their online application in the Graduate School system:
- Resumé or CV
* Personal statement describing why you are interested in the YDL M.Ed. program, your experiences working with youth and potential career aspirations (limit two pages).
* Short essay questions:
  - What draws you to the field of youth work?
  - What insights and questions from your work with youth are you interested in exploring?
  - How do you think about learning and what do you want and need in a learning space?
* Unofficial transcripts from all post-secondary institutions you have attended or are currently attending, including the University of Minnesota.
* Letters of recommendation from at least two persons (e.g., administrators, colleagues, instructors) familiar with your performance and your capacity for youth development leadership.
* Application fee, charged when the online application is submitted. Fee must be paid with a credit card.

Application deadlines are updated annually. Please reference the YDL website for the actual dates.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 21 major credits and 9 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The portfolio is a demonstration and personal assessment of individual learning and leadership in youth development work and in the YDL program. Successful completion of the portfolio presentation to the student’s faculty committee of two or more faculty is the final requirement of the YDL program.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Coursework**

NOTE: Students must take a total two credits of YOST 5960, in one credit increments, during their time in the program.

- **YOST 5950** - Ways of Knowing in Youth Development Leadership: Using Research and Evaluation to Support Community (3.0 cr)
- **YOST 5952** - Everyday Lives of Youth (3.0 cr)
- **YOST 5954** - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
- **YOST 5956** - Organizational Approaches to Youth Development (3.0 cr)
- **YOST 5958** - Community Context for Youth Development Leadership (3.0 cr)
- **YOST 5960** - Seminar in Youth Development Leadership (1.0 cr)
- **YOST 5962** - Leadership Field Experience: Youth Development (4.0 cr)

**Elective Credits**

9 or more 5xxx level elective credits must be selected with approval of faculty adviser.
Twin Cities Campus
Agricultural Education M.S.
*Applied Economics*
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

**Contact Information:**
Agricultural Education
146 Ruttan Hall
1994 Buford Ave.
St. Paul, MN 55108
Email: ageddgs@umn.edu
Website: https://ag-ed.cfans.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 40 to 47
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This Master's degree leads to an initial licensure in Agricultural Education. Master of Science (MS)/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards of the Minnesota Board of Teaching.

The agricultural education initial licensure program at the University of Minnesota is designed to help students become accomplished professional educators who can help students succeed in the classroom. The program prepares inquiring, analytical, and reflective professional educators who can teach in the classroom and lead in the schools.

Students enter a 12 to 15-month program integrating educational theory with classroom practice. Working closely with experienced teachers, students observe firsthand the daily rewards and pressures of their profession.

Flexibility is an important advantage of this program. Students may enroll in any semester and are welcomed into the entire agriculture education program, building valuable professional support. A second advantage is that most program credits may be applied toward completion of the MS degree.

This program includes two components: initial licensure and the MS degree. After successfully completing licensure requirements and appropriate work experience, students are recommended for state licensure to teach agricultural education in grades 5-12.

**Accreditation**
This program is accredited by Minnesota Professional Educator Licensing and Standards Board (PELSB)

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 2.50.

Relevant professional experience and/or a relevant undergraduate major is required.

Other requirements to be completed before admission:
Experience in youth education.

Content course credits are required for licensure. Students can take these courses as an undergrad prior to entering the program or enroll in these courses concurrently (totaling 42 credits). Applicable content areas include, but are not limited to:
Animal Science (7.0 credits)
Applied Economics and Agribusiness (7.0 credits)
Food Science (3.0 credits)
Natural Resources (3.0 credits)
Plant Science (7.0 credits)
Soil Science (4.0 credits)
Technology [Ag Mechanics] (8.0 credits)
General Psychology (3.0 credits)

Special Application Requirements:
In addition to other required materials, applicants must submit a personal statement addressing career interests and prior youth experience, a diversity statement, a résumé and two letters of recommendation from individuals who can attest to the applicant's potential in the field.

Admissions is done on a rolling basis with the following semester deadlines: March 1 (Summer), July 1 (Fall), and November 1 (Spring).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C:
Plan C requires 40 to 47 major credits and up to null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken A-F (unless only offered S/N) and students must earn a grade of C- or better.

Additional requirements and credits may be required to be recommended for licensure. Required licensure coursework is subject to change. Please visit https://www.cehd.umn.edu/teaching/ for the most up to date requirements and coursework.

The University of Minnesota does not award licensure. The Professional Educator Licensing and Standards Board (PELSB) determines licensure for the state of Minnesota in the areas of teacher education and related services.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Initial Licensure
This sub-plan is limited to students completing the program under Plan C.

Agricultural Education Coursework (32.5 credits)
The following courses are required for Agricultural Education Teacher Licensure.

Agricultural Education (21 credits)
Take the following courses. AECM 5696 must be taken for a total of 6 credits.
- AECM 5115 - Foundations of Agricultural Education (3.0 cr)
- AECM 5125W - Designing Curriculum & Instruction for Agricultural Education [WI] (3.0 cr)
- AECM 5135 - Instructional Methodology for Agricultural Education (3.0 cr)
- AECM 5145 - Agricultural Education Classroom & Program Leadership (3.0 cr)
- AECM 5155 - Agricultural Education Teaching Seminar (3.0 cr)
- AECM 5696 - Teaching Internship (2.0 - 10.0 cr)

Education (11.5 credits)
Take the following courses. CI 5452 must be taken for 2 credits.
- CI 4602 - English Learners and Academic Language (1.0 cr)
- CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
- CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
EPSY 4001 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
OLPD 5005 - School and Society (2.0 cr)
OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)

**Additional Coursework (5 credits)**
Take AECM 5280 and AECM 5995 for a total of 5 credits in consultation with your faculty advisor.
AECM 5995 - Integrating Paper–Master of Education: Agricultural and Extension Education (1.0 - 5.0 cr)
AECM 5280 - Current Issues for the Beginning Agricultural Education Teacher (1.0 - 3.0 cr)

**Elective Coursework (2.5 to 7 credits)**
Select electives in consultation with your advisor. Additional courses not listed here may be approved.
AECM 5220 - Special Topics in Agriculture Education and Extension (1.0 - 3.0 cr)
or AECM 5993 - Directed Study in Agricultural Education and Extension (1.0 - 4.0 cr)
Twin Cities Campus
Animal Sciences M.S.
Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/graduate-program

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Animal Science MS program concentrates on one of the animal sciences emphasis areas: genetics; growth biology; nutrition; physiology; or production systems. Students have the option of tailoring their individual programs to include study in more than one emphasis area.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: The Plan B project requires approximately 120 hours to complete. The nature and extent of the project is agreed upon in advance by the student and faculty advisor.

This program may be completed with a minor.

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Information current as of November 07, 2022
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

**Ethics Course (0.5 to 3 credits)**
Select one course from the following in consultation with the advisor:
- ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
- ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
- APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Seminar (3 credits)**
Take 1 credit of ANSC 8510 3 times.
- ANSC 8510 - Graduate Seminar (1.0 cr)

**Elective Courses**
Select additional coursework in consultation with the advisor to meet the minimum credit requirements for the degree.
- ANSC 5015 - Animal Welfare Science and Ethics (3.0 cr)
- ANSC 5025 - Gut Microbiome Systems (3.0 cr)
- ANSC 5035 - Animal Welfare Judging and Assessment (3.0 cr)
- ANSC 5555 - Applied Livestock and Poultry Microbiology (2.0 cr)
- ANSC 5625 - Nutritional Biochemistry (3.0 cr)
- ANSC 5626 - Nutritional Physiology (3.0 cr)
- ANSC 8011 - Applied Statistical Models and Analysis for Animal Science Professionals (3.0 cr)
- ANSC 8211 - Animal Growth and Development (3.0 cr)
- ANSC 8311 - Animal Bioenergetics (3.0 cr)
- ANSC 8312 - Protein Metabolism (3.0 cr)
- ANSC 8330 - Concepts and Developments in Animal Science (1.0 - 2.0 cr)
- ANSC 8394 - Research in Animal Nutrition (1.0 - 3.0 cr)
- ANSC 8594 - Research in Animal Science (1.0 - 3.0 cr)
- ANSC 8990 - Curricular Practical Training (1.0 cr)
- CMB 5915 - Essential Statistics for Life Sciences (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)

**Plan Options**

**Plan A**
Take 10 master's thesis credits.

**Thesis Credits**
- ANSC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B**

**Program Sub-plans**
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

**Applied Poultry Science**
The MS Applied Poultry Science subplan intends to fill the higher education gap in poultry production and health, catering to the critical needs of industry workforce development locally in MN and nationwide. The subplan pioneers an online and asynchronous poultry higher education framework for poultry students, working professionals, and current poultry industry employees who would like to accelerate their careers.

Plan A students must enroll in 13 required coursework credits, and 5 elective coursework credits in addition to their seminar and ethics requirements and thesis credits. Plan B students must enroll in 13 required coursework credits and 7 elective coursework credits in addition to their seminar and ethics requirements and 10 required credits of IFSL courses for the capstone project.

**Required Courses**
CMB 5915 - Essential Statistics for Life Sciences (3.0 cr)
PouL 5015 - Broiler/Layer/Turkey Rotation (1.0 cr)
PouL 5101 - Living in a microbial world and raising animals: the poultry perspective (3.0 cr)
PouL 5102 - How safe is your chicken? Food safety from a poultry perspective (3.0 cr)
PouL 5103 - Poultry biosecurity: framework for healthy production (3.0 cr)

Elective Courses
Plan A students select at least 5 credits, and Plan B students at least 7 credits from the following in consultation with the advisor.

- ANSC 5555 - Applied Livestock and Poultry Microbiology (2.0 cr)
- PouL 5001 - Avian Anatomy and Physiology (1.0 cr)
- PouL 5002 - Poultry Nutrition (1.0 cr)
- PouL 5003 - Poultry Diseases (1.0 cr)
- PouL 5013 - Animal Welfare (1.0 cr)
- PouL 5016 - Capstone in Molecular Technologies (1.0 cr)

Ethics Course (0.5 to 3 credits)
Select one course from the following in consultation with the advisor:

- ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
- ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
- APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Seminar (3 credits)
Take 1 credit of ANSC 8510 3 times.

- ANSC 8510 - Graduate Seminar (1.0 cr)

Plan Option

Plan B
If student in the subplan is pursuing a Plan B Masters then take at least 10 credits from the following courses in consultation with the advisor.

- HRIR 5443 - Principles of Effective Coaching (2.0 cr)
- HRIR 6484 - Management of Teams (2.0 cr)
- IFSL 7001 - Keys to Authentic and Effective Leadership (2.0 cr)
- IFSL 7011 - Food Production Farm to Fork (2.0 cr)
- IFSL 7021 - Food Governance, Policy, and Regulation (2.0 cr)
- IFSL 7031 - Food Security, Safety, and Defense (2.0 cr)
- IFSL 7041 - Food Business, Marketing, and Product Development (2.0 cr)
- IFSL 7051 - Leading Across Integrated Food Systems (2.0 cr)
Twin Cities Campus

Animal Sciences Minor

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: https://www.ansci.umn.edu/graduate-program

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students pursuing the Animal Sciences minor concentrate on one of the animal sciences emphasis areas: genetics; growth biology; nutrition; physiology; or production systems. Students have the option of tailoring their minor to include study in more than one emphasis area.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students majoring in other programs who wish to declare a minor in Animal Science should contact the Animal Science Director of Graduate Studies.

Requirements are designed to fit the student's needs. A master's minor requires 6 credits in areas not closely related to the major; no more than 2 of these credits may be in research or special problems. A doctoral minor requires 12 credits in areas not closely related to the major; no more than 3 of these credits may be in research or special problems. Use of 4xxx-level courses are reviewed by and up to the discretion of the Director of Graduate Studies.

Coursework
Students should select coursework in consultation with their major program advisor, and the AnSc faculty member who will serve on their exam committee, to satisfy the minor requirements. Other coursework can be selected with approval by AnSc's Director of Graduate Studies.

ANSC 5015 - Animal Welfare Science and Ethics (3.0 cr)
ANSC 5025 - Gut Microbiome Systems (3.0 cr)
ANSC 5035 - Animal Welfare Judging and Assessment (3.0 cr)
ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
ANSC 5099 - Special Workshop in Animal Science (1.0 - 6.0 cr)
ANSC 5555 - Applied Livestock and Poultry Microbiology (2.0 cr)
ANSC 5625 - Nutritional Biochemistry (3.0 cr)
ANSC 5626 - Nutritional Physiology (3.0 cr)
ANSC 8011 - Applied Statistical Models and Analysis for Animal Science Professionals (3.0 cr)
ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
ANSC 8211 - Animal Growth and Development (3.0 cr)
ANSC 8311 - Animal Bioenergetics (3.0 cr)
ANSC 8312 - Protein Metabolism (3.0 cr)
ANSC 8330 - Concepts and Developments in Animal Science (1.0 - 2.0 cr)
ANSC 8394 - Research in Animal Nutrition (1.0 - 3.0 cr)
ANSC 8594 - Research in Animal Science (1.0 - 3.0 cr)
ANSC 8990 - Curricular Practical Training (1.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Masters**

**Minor Requirements**

The AnSci program does not require specific courses for completion of the minor. The minor requires at least 6 credits of graduate-level courses to be chosen in consultation with the student's major adviser and the AnSci faculty member who will serve on the student's examination committee as the minor program representative.

The proposed coursework will be reviewed by AnSc's Director of Graduate Studies and must be approved before the student can submit their GPAS.

**Doctoral**

**Minor Requirements**

The AnSci program does not require specific courses for completion of the minor. The minor requires at least 12 credits of graduate-level courses to be chosen in consultation with the student's major adviser and the AnSci faculty member who will serve on the student's examination committee as the minor program representative.

The proposed coursework will be reviewed by AnSc's Director of Graduate Studies and must be approved before the student can submit their GPAS.
Twin Cities Campus
Animal Sciences Ph.D.
Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: https://www.ansci.umn.edu/graduate-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Animal Science PhD program concentrates on one of the animal sciences emphasis areas: genetics, nutrition, physiology, or production systems. Students have the option of tailoring their program to include study in more than one emphasis area and to emphasize basic or applied science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in agriculture or a biological field with training in biology, chemistry, physics, and mathematics is required.

A masters degree in agriculture or a biological field is required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

No more than 7 credits may be 4000 level courses.

**Ethics Course (.5 to 3 credits)**
Select 1 course from the following in consultation with the advisor:

- ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
- ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
- APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Seminar (4 credits)**
Take 1 credit of ANSC 8510 4 times.

- ANSC 8510 - Graduate Seminar (1.0 cr)

**Additional Coursework (17 to 20 credits)**
Select from the following in consultation with the advisor. Other coursework may be applied to this requirement with advisor approval.

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- ANSC 5015 - Animal Welfare Science and Ethics (3.0 cr)
- ANSC 5025 - Gut Microbiome Systems (3.0 cr)
- ANSC 5035 - Animal Welfare Judging and Assessment (3.0 cr)
- ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
- ANSC 5099 - Special Workshop in Animal Science (1.0 - 6.0 cr)
- ANSC 5555 - Applied Livestock and Poultry Microbiology (2.0 cr)
- ANSC 5625 - Nutritional Biochemistry (3.0 cr)
- ANSC 5626 - Nutritional Physiology (3.0 cr)
- ANSC 8011 - Applied Statistical Models and Analysis for Animal Science Professionals (3.0 cr)
- ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
- ANSC 8211 - Animal Growth and Development (3.0 cr)
- ANSC 8311 - Animal Bioenergetics (3.0 cr)
- ANSC 8312 - Protein Metabolism (3.0 cr)
- ANSC 8330 - Concepts and Developments in Animal Science (1.0 - 2.0 cr)
- ANSC 8394 - Research in Animal Nutrition (1.0 - 3.0 cr)
- ANSC 8594 - Research in Animal Science (1.0 - 3.0 cr)
- ANSC 8990 - Curricular Practical Training (1.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- BIOL 6021 - Biochemistry (3.0 cr)
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CMB 5915 - Essential Statistics for Life Sciences (3.0 cr)
- CMB 8134 - Ethical Conduct of Animal Research (3.0 cr)
- CMB 8560 - Research and Literature Reports (1.0 cr)
- CMB 8910 - Statistical Principles of Research Design (3.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- FSCN 5122 - Food Fermentations and Biotechnology (2.0 cr)
- FSCN 5123 - Molecular Biology for Applied Scientists (1.0 cr)
- FSCN 5312 - Food Analysis (4.0 cr)
- FSCN 5481 - Sensory Evaluation of Food Quality (2.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
- MICE 5035 - Personal Microbiome Analysis (3.0 cr)
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)
- NUTR 5625 - Nutritional Biochemistry (3.0 cr)
- NUTR 5626 - Nutritional Physiology (3.0 cr)
- NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
- PMB 5111 - Microbial Physiology and Diversity (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
VMED 5410 - Scientific Writing and Speaking (2.0 cr)
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)

Thesis Credits
Take 24 doctoral thesis credits
ANSC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Applied Economics M.S.
Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: https://apec.umn.edu/graduate/ms

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS degree in applied economics prepares students for employment opportunities in the public and private sectors and for further graduate study. This rigorous but flexible program includes core coursework in economic theory and quantitative methods and offers opportunities for specialized coursework and research in all the fields of study offered by the program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Coursework covering:
i) principle and intermediate microeconomic and macroeconomic theory,
ii) univariate and multivariate differential and integral calculus, and
iii) introductory statistics

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with the applicant's scholarship and research potential, a complete set of college or university transcripts, and a clearly written statement of academic and career interests, goals, and objectives, and a diversity statement. For complete application instructions, visit the website: https://apec.umn.edu/graduate/admissions. Students should apply by the December 10 deadline to ensure priority consideration for admissions and funding.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** 30 total credits including 24-26 credits of coursework and 4-6 APEC 8793 project credits. Complete a capstone project demonstrating an understanding of the theoretical or empirical tools of economics. Take a final oral exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grading basis must be taken A-F.

**Required Coursework (11 to 14 credits)**

**Econometrics (3 to 4 credits)**
- Select APEC 5031 (3 credits) or APEC 8211 and APEC 8212 (4 credits total) in consultation with the advisor.
  - APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
  - or APEC 8211 - Econometric Analysis I (2.0 cr)
  - APEC 8212 - Econometric Analysis II (2.0 cr)

**Macroeconomic Theory (3 or 4 credits)**
- Select APEC 5032 (3 credits), or ECON 8105 AND ECON 8106 (4 credits), or APEC 8213 AND APEC 8214 (4 credits)
  - APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
  - or ECON 8105 - Macroeconomic Theory (2.0 cr)
  - ECON 8106 - Macroeconomic Theory (2.0 cr)
  - or APEC Doctoral Level Options
    - APEC 8213 - Econometric Analysis III (2.0 cr)
    - APEC 8214 - Econometric Analysis IV (2.0 cr)

**Microeconomics Theory (3 to 4 credits)**
- Select APEC 5151 (3 credits) or APEC 8001 and APEC 8002 (4 credits total) in consultation with the advisor.
  - APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
  - or APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
  - APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)

**Seminars (2 credits)**
- Take the following seminars:
  - APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
  - APEC 8902 - Graduate Research Development Seminar (1.0 cr)

**Elective Coursework (9 to 13 credits)**
- Plan A students select at least 9 credits, and Plan B students select at least 13 credits from the following, in consultation with the advisor. At least 3 credits must be APEC, ECON, or STAT courses. STAT 5021 cannot be applied to this requirement.
  - APEC 5xxx
  - APEC 8xxx
  - ECON 5xxx
  - ECON 8xxx
  - STAT 5xxx
  - STAT 8xxx

**Plan Options**

**Plan A**

**Thesis Credits**
- Take 10 masters thesis credits.
  - APEC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
- OR-

**Plan B**
Plan B Project (4 to 6 credits)
Take 4 to 6 credits in consultation with the advisor.
APEC 8793 - Master's Paper: Plan B Project (1.0 - 6.0 cr)

Joint- or Dual-degree Coursework: MS-Applied Economics/MBA
Student may take a total of 18 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Integrated BS-Agricultural Food Business Management/MS-Applied Economics
The department offers an integrated Bachelor of Science-Agricultural Food Business Management and Master of Science-Applied Economics program. The integrated BS-AFBM/MS-APEC program offers students the opportunity to earn a bachelors degree and a masters degree in five years. The integrated program emphasizes education in applied economics and provides preparation for students wishing to pursue a career in agribusiness. Students can complete a Plan A option, which balances coursework and research development, or a Plan B option that focuses more on coursework.

The integrated program offers streamlined admission from the undergraduate program to the graduate program (GRE is not required); flexibility in fulfilling required courses for both degrees in the senior year; and eligibility for teaching and research assistantships. The BS-AFBM and MS-APEC degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MS degree are permitted to count credits originally planned for the graduate program toward their BS-AFBM technical electives.

Students pursuing the integrated degree may apply between 9 and 16 graduate-level (5xxx-level and above) credits taken during the integrated senior year toward MS degree requirements.

Students must spend a minimum of two semesters as a graduate student after the completion of their undergraduate degree.

Integrated BS-Applied Economics/MS-Applied Economics
The department offers an integrated Bachelor of Science-Applied Economics and Master of Science-Applied Economics program. The integrated BS-APEC/MS-APEC program offers students the opportunity to earn a bachelors degree and a masters degree in five years. The integrated program emphasizes education in applied economics and provides preparation for students wishing to pursue a career in applied economics. Students can complete a Plan A option, which balances coursework and research development, or a Plan B option that focuses more on coursework.

The integrated program offers streamlined admission from the undergraduate program to the graduate program (GRE is not required); flexibility in concurrently enrolling in undergraduate-level and graduate-level courses in the senior year; and eligibility for teaching and research assistantships. The BS-APEC and MS-APEC degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MS degree are permitted to count credits originally planned for the graduate program toward their BS-APEC technical electives.

Students pursuing the integrated degree may apply between 9 and 16 graduate-level (5xxx-level and above) credits taken during the integrated senior year toward MS degree requirements.

Students must spend a minimum of two semesters as a graduate student after the completion of their undergraduate degree.
Twin Cities Campus
Applied Economics Minor
Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdas@umn.edu
Website: https://apec.umn.edu/graduate/phd/phd-minor-requirements

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate study in applied economics requires an operational knowledge of economic theory and modern methods of quantitative analysis, as well as practical application in specialized fields of inquiry, which include food and agricultural economics; health economics; labor economics; policy analysis; resource and environmental economics; and trade and development economics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Applied Economics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework applied to the minor must be approved by the Applied Economics director of graduate studies; and taken on the A-F grading basis with a minimum grade of B for each course.

The minimum cumulative GPA for minor field coursework is 3.00.

Required Coursework (3 to 4 credits)
Select credits from the following in consultation with the Applied Economics director of graduate studies:
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
Electives (6 to 12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following with approval of the Applied Economics director of graduate studies.

- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- APEC 5211 - Regional Economic Analysis (3.0 cr)
- APEC 5451 - Food Marketing Economics (3.0 cr)
- APEC 5481 - Futures and Options Markets (3.0 cr)
- APEC 5511 - Labor Economics (3.0 cr)
- APEC 5711 - Agricultural and Environmental Policy (3.0 cr)
- APEC 5721 - Economics of Science and Technology Policy (3.0 cr)
- APEC 5751 - Global Trade and Policy (3.0 cr)
- APEC 5821 - Business Economics and Strategy (3.0 cr)
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- APEC 8213 - Econometric Analysis III (2.0 cr)
- APEC 8214 - Econometric Analysis IV (2.0 cr)
- APEC 8341 - Applied Public Finance (3.0 cr)
- APEC 8401 - Agricultural Markets and Policy (2.0 cr)
- APEC 8402 - Information and Behavioral Economics (2.0 cr)
- APEC 8403 - Applied Consumer Theory (3.0 cr)
- APEC 8404 - Applied Production Theory (3.0 cr)
- APEC 8501 - Labor Economics I (2.0 cr)
- APEC 8502 - Labor Economics II (2.0 cr)
- APEC 8601 - Natural Resource Economics (3.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- APEC 8701 - Trade and Development I (2.0 cr)
- APEC 8702 - Trade and Development II (2.0 cr)
- APEC 8703 - Trade and Development III (2.0 cr)
- APEC 8704 - Trade and Development IV (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Applied Economics Ph.D.
Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: https://apec.umn.edu/graduate/phd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Applied Economics PhD program prepares students for careers in academia, government, and the private sector. Required coursework includes microeconomic theory and modeling, application of statistical methods to economics (econometrics), and macroeconomic theory and modeling. Students pursue specialized elective coursework covering additional optimization methods, natural resource and environmental economics, food and agricultural economics, labor economics, development economics, health economics, and policy analysis. The emphasis of the program is on rigorous empirical testing of economics hypotheses and quantitative policy evaluation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Coursework covering:
- principle and intermediate microeconomic and macroeconomic theory,
- univariate and multivariate differential and integral calculus,
- linear algebra,
- differential equations,
- introductory statistics, and
- regression analysis.

Completion of a relevant master's degree or coursework in mathematical statistics are also recommended.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with the applicant's scholarship and research potential, a complete set of college or university transcripts, a clearly written statement of academic and career interests, goals, and objectives, and a diversity statement. For complete application instructions, visit the website: https://apec.umn.edu/graduate/admissions.

Students should apply by the December 10 to ensure priority consideration for admissions and funding.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
The preferred English language test is Test of English as Foreign Language (IELTS Total Score: 6.5, MELAB Final score: 80)

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

- 42 credits are required in the major.
- 0 credits are required outside the major.
- 24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

All courses offered on both the A-F and S/N grade basis must be taken A-F.

Students must also:

- i) pass a written preliminary examination in microeconomic theory;
- ii) pass a qualifying research paper requirement;
- iii) complete the requirements for two of its six fields or create one individualized field in consultation with their advisor: Agricultural and Food Economics, Health Economics, Labor and Population, Policy Analysis, Resource and Environmental Economics, Trade and Development;
- iv) pass an oral preliminary exam;
- v) write a dissertation; and
- vi) pass a final oral exam.

**Microeconomic Theory (8 credits)**

Select 1 of the following microeconomics theory sequences:

- **APEC - Applied Microeconomic Theory**
  - APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
  - APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
  - APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
  - APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)

- **ECON - Microeconomic Theory (Majors Sequence)**
  - ECON 8101 - Microeconomic Theory (2.0 cr)
  - ECON 8102 - Microeconomic Theory (2.0 cr)
  - ECON 8103 - Microeconomic Theory (2.0 cr)
  - ECON 8104 - Microeconomic Theory (2.0 cr)

**Macroeconomic Theory (8 credits)**

Take the following courses:

- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)

**Econometrics (8 credits)**

Take the following courses:

- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- APEC 8213 - Econometric Analysis III (2.0 cr)
- APEC 8214 - Econometric Analysis IV (2.0 cr)

**First Year Seminars (2 credits)**
Take the following:
- APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
- APEC 8902 - Graduate Research Development Seminar (1.0 cr)

**Second Year Seminars (2 credits)**
Take the following:
- APEC 8903 - PhD Qualifying Paper Seminar I (1.0 cr)
- APEC 8904 - PhD Qualifying Paper Seminar II (1.0 cr)

**Elective Coursework (18 credits)**
Select 18 credits, which can include a maximum of 6 ECON credits, from the following in consultation with the advisor.
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- APEC 8221 - Programming for Econometrics (2.0 cr)
- APEC 8222 - Big Data Methods in Economics (2.0 cr)
- APEC 8341 - Applied Public Finance (3.0 cr)
- APEC 8401 - Agricultural Markets and Policy (2.0 cr)
- APEC 8402 - Information and Behavioral Economics (2.0 cr)
- APEC 8403 - Applied Consumer Theory (3.0 cr)
- APEC 8404 - Applied Production Theory (3.0 cr)
- APEC 8501 - Labor Economics I (2.0 cr)
- APEC 8502 - Labor Economics II (2.0 cr)
- APEC 8601 - Natural Resource Economics (3.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- APEC 8701 - Trade and Development I (2.0 cr)
- APEC 8702 - Trade and Development II (2.0 cr)
- APEC 8703 - Trade and Development III (2.0 cr)
- APEC 8704 - Trade and Development IV (2.0 cr)
- APEC 8803 - Marketing Economics (3.0 cr)
- APEC 8804 - Managerial Economics (3.0 cr)
- ECON 8119 - Cooperative Game Theory (2.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)
- ECON 8401 - International Trade and Payments Theory (2.0 cr)
- ECON 8402 - International Trade and Payments Theory (2.0 cr)
- ECON 8403 - International Trade and Payments Theory (2.0 cr)
- ECON 8501 - Wages and Employment (2.0 cr)
- ECON 8502 - Wages and Employment (2.0 cr)
- ECON 8503 - Wages and Employment (2.0 cr)
- ECON 8504 - Wages and Employment (2.0 cr)
- ECON 8505 - Advanced Topics in Labor Economics (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8701 - Monetary Economics (2.0 cr)
- ECON 8702 - Monetary Economics (2.0 cr)
- ECON 8704 - Financial Economics (2.0 cr)
- ECON 8705 - Financial Economics (2.0 cr)
- ECON 8801 - Public Economics (2.0 cr)
- ECON 8803 - Public Economics (2.0 cr)
- HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
- PA 8302 - Applied Policy Analysis (4.0 cr)
- PA 8312 - Analysis of Discrimination (4.0 cr)
- PA 8331 - Economic Demography (3.0 cr)
- PUBH 8832 - Economics of the Health Care System (3.0 cr)
- PUBH 8811 - Research Methods in Health Care (3.0 cr)
- PUBH 8821 - Health Economics II (3.0 cr)

**Doctoral Thesis Credits**
Students must enroll for a minimum of 24 thesis credits. Take 24 or more credit(s) from the following:
- APEC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Applied Plant Sciences M.S.
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsgrad@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applied Plant Sciences is an interdisciplinary program for educating students to become professional scientists well-grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship as well as skills needed for professional communication, teamwork, and leadership. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Plant and Microbial Biology; Plant Pathology; Soil, Water, and Climate; Ecology, Evolution and Behavior; and Fisheries, Wildlife and Conservation Biology. The faculty embrace the University of Minnesota's position that promoting and supporting diversity among the student body is central to our academic mission.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a BS or BA degree in agriculture, biology, or other related life science. Students with a BS or BA degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; and a clearly written personal statement of career interests, goals, and objectives as part of the online application. Students should apply by December 5 for admission into fall semester of the following year. Students should apply by October 15 for admission into spring semester of the following year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Determined in consultation with advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

MS students must complete the core curriculum, requirements for their specialization track, and present one graduate seminar. Additional course requirements are flexible and determined in consultation with the students advisor(s) and advisory committee.

Core Curriculum

Required Courses (3.5 credits)

Take the following courses:
- AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
- APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- APSC 8270 - Graduate Seminar (2.0 cr)

Select at least 3 credits from the following in consultation with the advisor:
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)

Plan A Thesis Credits

Plan A students must take at least 10 master's thesis credits.
- APSC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Agronomy and Agroecology
Students conduct research to increase their knowledge of cropping systems and weed science, including alternative approaches and...
management strategies. Emphasis is on improving production efficiency and profitability in an environmentally sound approach that benefits society. Mechanisms of crop physiology and ecology underlying plant responses to the environment are a particular emphasis of this track.

Plan A students complete 13.5 credits, and Plan B students complete 23.5 credits for this sub-plan in consultation with the advisor.

Other courses can be applied to sub-plan requirements with agreement of the advisor, the advisory committee, and director of graduate studies.

Agroecology/Agronomy Courses
Take at least 2 courses from the following:

- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
- AGRO 5021 - Plant Breeding Principles (3.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
- APSC 8201 - Advanced Plant Breeding (3.0 cr)
- APSC 8280 - Current Topics in Applied Plant Sciences (1.0 - 3.0 cr)
- DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
- FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
- GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Plant Biology Course
Take 1 course from the following:

- PMB 5111 - Microbial Physiology and Diversity (3.0 cr)
- PMB 5412 - Plant Physiology and Development (3.0 cr)
- PMB 5601 - Topics in Plant Biochemistry (3.0 cr)

Additional Courses
Take at least 1 course from the following:

- EEB 4068 - Plant Physiological Ecology (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
- SOIL 5611 - Soil Biology and Fertility (4.0 cr)

Horticulture
Students conduct research related to fruits, vegetables, potatoes, flowers, ornamental trees and shrubs, or turf; on the physiology, production, environmental impact of cropping systems; and use of horticultural crops. Research areas include the effect of horticultural commodities on human health, hormonal, and stress physiology; flower development and flowering physiology; integrated pest management; post harvest physiology; and cropping system strategies. Students get a broad range of experiences in the field, greenhouse, and/or laboratory using genetic, molecular, biochemical, and ecological tools to answer research questions.

Plan A students complete 13.5 credits, and Plan B students complete 23.5 credits for this sub-plan in consultation with the advisor.

Other courses can be applied to sub-plan requirements with agreement of the advisor, the advisory committee, and director of graduate studies.

Cross Commodity Horticulture
Take at least 1 course from the following:

- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 4461 - Horticultural Marketing (3.0 cr)
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
HORT 5023 - Public Garden Management (2.0 cr)
HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
MBA 6211 - Marketing Management (3.0 cr)
MKTG 6051 - Marketing Research - Rapid Insights (2.0 cr)
MKTG 6055 - Buyer Behavior (2.0 cr)
MKTG 6082 - Brand Strategy (2.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
Commodity-based Horticulture
Take at least 1 course from the following:
HORT 4061W - Turfgrass Management [WI] (3.0 cr)
HORT 4063 - Turfgrass Science (3.0 cr)
HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
HORT 5033 - Growing Fruit & Vegetables for Local and Organic Markets (4.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
Additional Coursework
Other courses can be substituted with agreement of the advisor, advisory committee, and director of graduate studies.
AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 8023 - Evolution of Crop Plants (3.0 cr)
APSC 8201 - Advanced Plant Breeding (3.0 cr)
EEB 4068 - Plant Physiological Ecology (3.0 cr)
EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
ESPM 5108 - Ecology of Managed Systems (4.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
PLPA 5202 - Field Plant Pathology (2.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)
PMB 5601 - Topics in Plant Biochemistry (3.0 cr)
SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
SOIL 5611 - Soil Biology and Fertility (4.0 cr)
Plant Breeding/Plant Molecular Genetics
This sub-plan allows students to select from genetic research projects ranging from applied plant breeding projects emphasizing breeding procedures and methodologies to molecular genetic projects doing biotechnology, genetic engineering, and genomic research in agronomic and horticultural crops. These research projects give students the opportunity to integrate the latest developments in the laboratory with applied applications in the field to reach the overarching goal of developing new germplasm that will improve the sustainability of our food/feed/fiber/fuel systems.
Plan A students complete 13.5 credits, and Plan B students complete 23.5 credits for this sub-plan in consultation with the advisor.
Other courses can be applied to sub-plan requirements with agreement of the advisor, the advisory committee, and director of graduate studies.

Plant Breeding
Take at least 1 course from the following:
AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
APSC 8201 - Advanced Plant Breeding (3.0 cr)

Genetics and Genomics
Take at least 2 courses from the following:
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCID 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)

Other Suggested Coursework
Other courses can be substituted with approval of the advisor, advisory committee, and director of graduate studies.
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
HORT 5023 - Public Garden Management (2.0 cr)
HORT 5033 - Growing Fruit & Vegetables for Local and Organic Markets (4.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
HORT 6141 - Scheduling Crops for Protected Environments (4.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
HORT 5007 - Advanced Plant Propagation (3.0 cr)
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)

**Computational Biology/Bioinformatics**
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Operations (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
GCD 8141 - Computational Genomics (3.0 cr)

**Professional Skills Development**
BIOL 5701 - Science Communication: A Primer for Scientists (2.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
HRIR 5222 - Creating and Managing Diversity and Inclusion (2.0 cr)
HRIR 6484 - Management of Teams (2.0 cr)
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)
MOT 8232 - Managing Technological Innovation (2.0 cr)

**Statistics**
ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
ANSC 8141 - Mixed Model Methods for Genetic Analysis (3.0 cr)
BIOL 5272 - Applied Biostatistics (4.0 cr)
ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
STAT 5052 - Statistical and Machine Learning (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

**Applied Plant Sciences**
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Plan A students complete 13.5 credits, and Plan B students complete 23.5 credits for this sub-plan in consultation with the advisor.

Other courses can be applied to sub-plan requirements with agreement of the advisor, the advisory committee, and director of graduate studies.
Genetics and Plant Breeding
Take at least 1 course from the following:
AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
AGRO 8023 - Evolution of Crop Plants (3.0 cr)
AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
APSC 8201 - Advanced Plant Breeding (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)

Organismal Biology
Take at least 1 course from the following:
HORT 5007 - Advanced Plant Propagation (3.0 cr)
HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)
PMB 5601 - Topics in Plant Biochemistry (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)

Cropping Systems, Communities, and Commodities
Take at least 1 course from the following:
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
HORT 4063 - Turfgrass Science (3.0 cr)
HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
HORT 5033 - Growing Fruit & Vegetables for Local and Organic Markets (4.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
PLPA 5202 - Field Plant Pathology (2.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Integrated BS Plant Science/MS APS Plant Breeding
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

CFANS offers an integrated Bachelor of Science (BS) in Plant Science and Master of Science (MS) in Applied Plant Sciences (Plant Breeding and Molecular Genetics track). The integrated BS/MS program offers students the opportunity to complete coursework for both degrees in five years by working toward a master's degree while simultaneously working toward their undergraduates degree. Plant Science undergraduate students in the Plant Breeding and Genetics sub-plan are welcome to apply to this program during their 3rd year of undergraduate study. During the 4th year, students take undergraduate and graduate courses concurrently and are advised by an undergraduate and graduate program adviser. Students must complete undergraduate degree requirements before the end of their fourth year.

Students in this program will complete the 120 undergraduate credits required for a BS degree in Plant Science by the end of the 4th year and must be awarded an undergraduate degree at the 4th year mark or earlier. During the 4th and 5th years, students will complete 30 graduate credits and a Plan A or B research project with a final oral defense as required for the Applied Plant Sciences MS degree. Students cannot double-count credits to meet credit requirements for both the undergraduate and graduate degrees. At least one course must be taken from each of the Plant Breeding areas and at least two courses from the Genetics & Genomics area. Additional course requirements are flexible and are determined in consultation with the student's advisor(s) and advisory committee.
Twin Cities Campus
Applied Plant Sciences Minor
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsgrad@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Applied Plant Sciences minor provides students in other fields an opportunity to gain knowledge and expertise in plant sciences at the molecular, organismal, and community levels with applications to sustainable production of horticultural and agronomic crops.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Applied Plant Sciences director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Coursework is determined in consultation with the Applied Plant Sciences director of graduate studies.

Required Course (1 Credit)
Select 1 of the following courses in consultation with the Applied Plant Sciences director of graduate studies:
APSC 8270 - Graduate Seminar (2.0 cr)
or APSC 8280 - Current Topics in Applied Plant Sciences (1.0 - 3.0 cr)

Electives (6 to 11 credits)
Master’s students select at least 6 credits, and doctoral students select at least 11 credits from the following to meet minimum credit requirements. Courses are selected in consultation with the Applied Plant Sciences director of graduate studies.
AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
AGRO 4888 - Issues in Sustainable Agriculture (2.0 cr)
AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
AGRO 8023 - Evolution of Crop Plants (3.0 cr)
AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
APSC 8201 - Advanced Plant Breeding (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
HORT 4063 - Turfgrass Science (3.0 cr)
HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
HORT 4461 - Horticultural Marketing (3.0 cr)
HORT 5007 - Advanced Plant Propagation (3.0 cr)
HORT 5023 - Public Garden Management (2.0 cr)
HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
PLPA 5202 - Field Plant Pathology (2.0 cr)
PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)
PMB 5601 - Topics in Plant Biochemistry (3.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral**
Twin Cities Campus
Applied Plant Sciences Ph.D.
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsgrad@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applied Plant Sciences is an interdisciplinary program for educating students to become professional scientists well-grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship as well as skills needed for professional communication, teamwork and leadership. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Plant and Microbial Biology; Plant Pathology; Soil, Water, and Climate; Ecology, Evolution and Behavior; and Fisheries, Wildlife and Conservation Biology. The faculty embrace the University of Minnesota's position that promoting and supporting diversity among the student body is central to our academic mission.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a BS or BA degree in agriculture, biology, or other related life science. Students with a BS or BA degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential: a complete set of official transcripts; and a clearly written personal statement of career interests, goals, and objectives as part of the online application. Students should apply by December 5 for admission into fall semester of the following year. Students should apply by October 15 for admission into spring semester of the following year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

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Information current as of November 07, 2022
MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 0 semesters must be completed before filing a Degree Program Form.

PhD students must complete the core curriculum, requirements for their specialization, and present one graduate seminar. Additional course requirements are flexible and determined in consultation with the students advisor(s) and advisory committee.

Required Courses (3.5 credits)
Take the following courses:
- AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
- APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- APSC 8270 - Graduate Seminar (2.0 cr)
Select at least 3 credits from the following:
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- FNRM 5313 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5204 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)

Take 1 of the following courses. If APSC 8280 is selected, consult with the advisor regarding the number of credits needed.
- APSC 8280 - Current Topics in Applied Plant Sciences (1.0 - 3.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Take 1 of the following courses:
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- CFAN 8101 - Professional Skills for Scientists (2.0 cr)

Electives
Select courses in consultation with the advisor, as needed, to complete 30 course credits.

Thesis Credits
Take at least 24 doctoral thesis credits.
- APSC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

**Agronomy and Agroecology**

Students conduct research to increase their knowledge of cropping systems and weed science, including alternative approaches and management strategies. Emphasis is on improving production efficiency and profitability in an environmentally sound approach that benefits society. Mechanisms of crop physiology and ecology underlying plant responses to the environment are a particular emphasis of this track.

Courses listed within agroecology/agronomy, plant biology, and ecology/plant pathology/soil science groups are provided as a guide for students and faculty. Other specialization courses can be substituted with agreement of the advisor, the advisory committee, and director of graduate studies.

**Agronomy/Agroecology**

Take 2 courses from the following list. If AGRO 5999 is selected, consult with the advisor regarding the number of credits needed.

- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
- AGRO 5021 - Plant Breeding Principles (3.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
- APSC 8201 - Advanced Plant Breeding (3.0 cr)
- APSC 8280 - Current Topics in Applied Plant Sciences (1.0 - 3.0 cr)
- DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
- FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
- GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

**Plant Biology**

Take 1 of the following courses or another course selected in consultation with the advisor:

- PMB 5412 - Plant Physiology and Development (3.0 cr)
- PMB 5601 - Topics in Plant Biochemistry (3.0 cr)

**Ecology/Plant Pathology/Soil Science**

Take at least 1 course from the following list:

- EEB 4068 - Plant Physiological Ecology (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
- SOIL 5611 - Soil Biology and Fertility (4.0 cr)

**Horticulture**

Students conduct research related to fruits, vegetables, potatoes, flowers, ornamental trees and shrubs, or turf; and on the physiology, production, environmental impact of cropping systems, and use of horticultural crops. Research areas include the effect of horticultural commodities on human health, hormonal, and stress physiology; flower development and flowering physiology; integrated pest management; post harvest physiology; and cropping system strategies. Students get a broad range of experiences in the field, greenhouse, and/or laboratory using genetic, molecular, biochemical, and ecological tools to answer research questions.

**Cross Commodity Horticulture**

Take at least 1 course from the following:

- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 4461 - Horticultural Marketing (3.0 cr)
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
- HORT 5023 - Public Garden Management (2.0 cr)
- MBA 6211 - Marketing Management (3.0 cr)
- MKTG 6051 - Marketing Research - Rapid Insights (2.0 cr)
- MKTG 6055 - Buyer Behavior (2.0 cr)
Commodity-based Horticulture

Take at least 1 course from the following:

- HORT 4061W - Turfgrass Management [WI] (3.0 cr)
- HORT 4063 - Turfgrass Science (3.0 cr)
- HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
- HORT 5033 - Growing Fruit & Vegetables for Local and Organic Markets (4.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)

Additional Coursework

Take at least 1 course from the following. Courses other than those listed below can be substituted with agreement of the advisor, advisory committee, and director of graduate studies.

- AGRO 5021 - Plant Breeding Principles (3.0 cr)
- AGRO 8023 - Evolution of Crop Plants (3.0 cr)
- APSC 8201 - Advanced Plant Breeding (3.0 cr)
- EEB 4068 - Plant Physiological Ecology (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- PMB 5412 - Plant Physiology and Development (3.0 cr)
- PMB 5601 - Topics in Plant Biochemistry (3.0 cr)
- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5560 - Plant Disease Resistance and Applications (3.0 cr)
- SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
- SOIL 5611 - Soil Biology and Fertility (4.0 cr)

Other Suggested Courses

Select courses, as needed, in consultation with the advisor to complete the 12.5 specialization credits required. The following courses have been taken by students in the Horticulture track. Other courses can be substituted with agreement of the advisor, advisory committee and director of graduate studies.

Agroecology and Cropping Systems
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Biochemistry
- BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)

Biotechnology/Genetics/Genomics
- GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
- PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)

Computational Biology/Bioinformatics
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- CSCI 4041 - Algorithms and Data Structures (4.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)

Physiology
- AGRO 8900 - Advanced Discussions (1.0 - 3.0 cr)
- PMB 5412 - Plant Physiology and Development (3.0 cr)

Plant Pathology
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)

**Professional Skills Development**
- MOT 5001 - Technological Business Fundamentals (2.0 cr)
- MOT 5002 - Creating Technological Innovation (2.0 cr)
- HRIR 6484 - Management of Teams (2.0 cr)

**Statistics**
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)

**Plant Breeding and Plant Molecular Genetics**
This track allows students to select from genetic research projects ranging from applied plant breeding projects emphasizing breeding procedures and methodologies to molecular genetic projects doing biotechnology, genetic engineering, and genomic research in agronomic and horticultural crops. These research projects give students the opportunity to integrate the latest developments in the laboratory with applied applications in the field to reach the overarching goal of developing new germplasm that will improve the sustainability of our food/feed/fiber/fuel systems.

**Plant Breeding**
Take at least 1 course from the following:
- AGRO 5021 - Plant Breeding Principles (3.0 cr)
- AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
- APSC 8201 - Advanced Plant Breeding (3.0 cr)

**Genetics and Genomics**
Take at least 2 courses from the following:
- AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
- AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)

**Other Coursework**
Courses other than those listed below can be substituted with approval of the advisor, advisory committee, and director of graduate studies.

**Agroecology and Cropping Systems**
- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
- HORT 5023 - Public Garden Management (2.0 cr)
- HORT 5033 - Growing Fruit & Vegetables for Local and Organic Markets (4.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

**Biochemistry**
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
- BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)

**Biotechnology/Genetics/Genomics**
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
- BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
- GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
- PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)

**Computational Biology/Bioinformatics**
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
GCD 8141 - Computational Genomics (3.0 cr)

Evolution
EEB 5409 - Evolution (3.0 cr)

Physiology
AGRO 8900 - Advanced Discussions (1.0 - 3.0 cr)
EEB 5068 - Plant Physiological Ecology (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)

Plant Pathology
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)

Professional Skills Development
BIOL 5701 - Science Communication: A Primer for Scientists (2.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
HRIR 5222 - Creating and Managing Diversity and Inclusion (2.0 cr)
MGMT 6084 - Management of Teams (2.0 cr)
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)
MOT 8232 - Managing Technological Innovation (2.0 cr)

Statistics
AGRO 5121 - Applied Experimental Design (4.0 cr)
ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
ANSC 8141 - Mixed Model Methods for Genetic Analysis (3.0 cr)
BIOL 5272 - Applied Biostatistics (4.0 cr)
ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
STAT 5052 - Statistical and Machine Learning (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Applied Plant Sciences
Students who choose to pursue the PhD without a specialization track must complete the APS required core curriculum and at least one course from these three areas: genetics and plant breeding; organismal biology; and cropping systems, communities, and commodities.

Genetics and Plant Breeding
Take at least 1 course from the following:
AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
APSC 8201 - Advanced Plant Breeding (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)

Organismal Biology
Take at least 1 course from the following:
HORT 5007 - Advanced Plant Propagation (3.0 cr)
HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)
PMB 5601 - Topics in Plant Biochemistry (3.0 cr)

**Cropping Systems, Communities, and Commodities**

Take at least 1 course from the following:

AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
HORT 4063 - Turfgrass Science (3.0 cr)
HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
HORT 5033 - Growing Fruit & Vegetables for Local and Organic Markets (4.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
PLPA 5202 - Field Plant Pathology (2.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
Twin Cities Campus

Bioproducts and Biosystems Science, Eng and Mgmt M.S.

Bioproducts and Biosystems Engineering

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: http://www.bbe.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Bioproducts and Biosystems Science Engineering and Management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security, while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in sustainable conversion of biomass into bio-based industrial and consumer products, and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources, including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more.

Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles, which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management.

Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
A bachelor's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university, is preferred.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Students complete a project that involves a total of about 120 hours of work, and write a Plan B paper on their project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A maximum of 4 special- or advanced-problems credits can be applied to degree requirements. Exception requests must be in writing, specify the circumstances that argue for an exception, and be supported by the students advisor(s). Final approval for the exception is the responsibility of the director of graduate studies.

Required Courses (5 credits)
Take the following courses. BBE 8013 is required; however, under special circumstances, and with approval of the BBE 8013 instructor, an alternative statistics course can be applied to the statistics requirement.

- BBE 8001 - Seminar I (1.0 cr)
- BBE 8002 - Seminar II (1.0 cr)
- BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)

Electives (15 to 25 credits)
Plan A students select 15 credits, and Plan B students select 25 credits in consultation with their graduate advisor to meet academic and career goals.

Plan Options

Plan A
Take 10 master's thesis credits.

- BBE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Integrated B.S.-Bioproducts & Biosystems Eng/M.S.-Bioproducts & Biosystems Sci, Eng & Mgmt
The College of Food, Agricultural and Natural Resource Sciences and the College of Science and Engineering offer an BS-Bioproducts and Biosystems Engineering/MS-Bioproducts & Biosystems Science, Engineering, and Management (BS-BBE/MS-BBSEM) program. This program allows students to complete their undergraduate and graduate degrees in five years. Applicants must be enrolled students in the University of Minnesota Twin Cities BS-BBE program. Applicants must be within 32 credits of completing the undergraduate degree, have a minimum GPA of 3.30, and have a strong recommendation from a BBE faculty member or instructor. Full application instructions can be found at: bbe.umn.edu/integrated

Students admitted to BS-BBE/MS-BBSEM will complete and be awarded an undergraduate degree within 4 years, with a fifth year as a graduate student to complete the masters degree. At least 14 credit hours need to be taken after the completion of the undergraduate degree. Please refer to bbe.umn.edu/integrated for additional information.
Integrated B.S.- Sustainable Systems Management /M.S. -Bioproducts & Biosystems Sci, Eng, & Mgmt

The College of Food, Agricultural and Natural Resource Sciences offers an BS-Sustainable Systems Management/MS-Bioproducts & Biosystems Science, Engineering, and Management (BS-SSM/MS-BBSEM) program. This program allows students to complete their undergraduate and graduate degrees in five years. Applicants must be enrolled students in the University of Minnesota Twin Cities BS-SSM program. Applicants must be within 32 credits of completing the undergraduate degree, have a minimum GPA of 3.30, and have a strong recommendation from an SSM faculty member or instructor. Full application instructions can be found at: bbe.umn.edu/integrated.

Students admitted to BS-SSM/MS-BBSEM will complete and be awarded an undergraduate degree within 4 years, with a fifth year as a graduate student to complete the masters degree. At least 14 credit hours need to be taken after the completion of the undergraduate degree. Please refer to bbe.umn.edu/integrated for additional information.
Bioproducts and Biosystems Science, Engineering and Management Minor

Bioproducts and Biosystems Engineering
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: http://www.bbe.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more. Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles, which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management. Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
The student must be in good standing in their degree program to apply for this minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Select at least 6 credits of graduate-level BBE coursework in consultation with an adviser and approved by the director of graduate
studies in bioproducts and biosystems science engineering and management.

**Doctoral**
Select at least 12 credits of graduate-level BBE coursework in consultation with an adviser and approved by the director of graduate studies in bioproducts and biosystems science engineering and management.
Twin Cities Campus

Bioproducts and Biosystems Science, Engineering and Management Ph.D.

Bioproducts and Biosystems Engineering

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN  55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: http://www.bbe.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD offered by the bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include “green” materials, chemicals and energy derived from bio-resources, including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more.

Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles, which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management.

Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong, diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Students seeking the PhD should have a bachelor’s degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university.

Special Application Requirements:
Students seeking the PhD should also have a master’s degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university. Students expecting to pursue a PhD normally complete a master of science Plan A degree before starting their PhD programs. Exceptional students who want to go straight to the PhD from the bachelor’s level may be admitted subject to conditions agreed upon by the advisor, the director of graduate studies, and the graduate program coordinator.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
Internet Based - Reading Score: 19
Paper Based - Total Score: 550

**IELTS**
- Total Score: 6.5

**MELAB**
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

30 credits are required in the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All doctoral level students must take BBE 8001, Seminar I (1 cr), and BBE 8002, Seminar II (1 cr), and BBE 8013, Parameter Estimation (3 cr), unless they can demonstrate to the BBE 8013 instructor that they have already mastered the course material, or have justified the selection of a suitable alternative.

BBE 8001, BBE 8002, and BBE 8013, if taken at the master's level, count toward the PhD and do not have to be retaken.

The PhD in bioproducts and biosystems science engineering and management requires extended study and intense intellectual effort, conducting cutting-edge research and advancing the forefront of knowledge in the subject matter area. Students develop skills that enable them to define problems or research questions, plan research, conduct independent research and/or lead research efforts, analyze data, and effectively communicate research results to a variety of audiences.

All PhD degree programs must include a minimum of 30 graduate course credits beyond the B.S. degree, and a minimum of 24 doctoral thesis credits (BBE 8888). PhD degree programs may contain up to 3 credits of enrichment courses.

#### Required Courses (5 credits)

BBE 8001 - Seminar I (1.0 cr)
BBE 8002 - Seminar II (1.0 cr)
BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)

#### Elective Courses (25 credits)

Select 25 elective credits in major area of study in consultation with the advisor, and approved by the director of graduate studies. The student is encouraged to take up to 3 credits of enrichment courses, which are included in the 25-credit requirement.

#### Thesis Credits (24 credits)

BBE 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Conservation Sciences M.S.
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 135 B Skok Hall, 2003 Upper Buford Circle, St. Paul, MN 55108 (612-624-7751)
Email: conssci@umn.edu
Website: http://www.conssci.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The conservation sciences (CS) program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select one of the three tracks, 1) conservation science or 2) fisheries and aquatic biology or 3) wildlife ecology & management. Students may also pursue a joint degree in law and conservation sciences through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A BS/BA degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but may be required to take selected courses in biology.

Special Application Requirements:
A statement of career goals and three letters of recommendation evaluating the applicant's potential for graduate study are required. TOEFL is required for applicants who speak English as a second language. Applicants to the joint law degree program must also apply to the Law School. Application deadline is December 15. Typically, students only are admitted for fall semester.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
• MN Batt

Key to test abbreviations (TOEFL, IELTS, MELAB, MN Batt).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B master's students must demonstrate familiarity with the tools of research or scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project. The Plan B project should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The advisory committee specifies both the nature and extent of the options available to satisfy this requirement, subject to approval by the director of graduate studies. The Plan B project must be satisfied independent of the courses in the student's program.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Core Course (3 credits)
Take the following course:
FW 8452 - Conservation Biology (3.0 cr)

Seminar (2 credits)
Take CBIO 2 times for a total of 2 credits. Students pursuing the Fisheries and Aquatic Biology track may substitute 1 credit of CBIO 8001 with 1 credit of FS 8200.
CONS 8001 - Conservation Biology Seminar (1.0 cr)
FW 8200 - Seminar (1.0 - 4.0 cr)

Statistics (3 credits)
Select at least 3 credits from the following. Other 5- or 8-level coursework can be applied to this requirement in consultation with the advisory committee.
BIOL 5272 - Applied Biostatistics (4.0 cr)
EEB 5371 - Principles of Systematics (3.0 cr)
FW 4001 - Biometry (4.0 cr)
FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Plan Options

Plan A
Take at least 10 master's thesis credits.
CONS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Joint- or Dual-degree Coursework: JD/Conservation Sciences-MS
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Conservation Science
The conservation science track is available for students wishing to emphasize this concentration within the conservation sciences degree. The track provides structure and oversight for students interested in the interface of population, species, and ecosystem biology with disciplines of social sciences, education, economics.

Electives (12 to 22 credits)
Plan A students select at least 12 credits, and Plan B students select at least 22 credits from the following list. Other 5- or 8-level courses can be applied to this requirement in consultation with the advisory committee.
Fisheries and Aquatic Biology

Three-quarters of the global ecosystem is water and most is a global commons. Many biologists and economists argue that freshwater is one of the most critical global resources and that the functional integrity and biodiversity within freshwater and marine ecosystems are highly threatened. The fisheries and aquatic biology (FAB) track is available for MS, PhD, and joint degree students wishing to emphasize this concentration. The track name will be posted to the transcript, and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in fisheries or aquatic biology. Combined with a typical undergraduate degree in biology or natural resource science, careful selection of courses in the graduate program will satisfy the educational requirements for professional certification by the American Fisheries Society.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Requests for admission to the track may be made during the application process or at any time after the student is admitted to conservation sciences.

**Required Coursework (6 credits)**
Select at least 6 credits from the following list. Other advanced fisheries or aquatic biology courses or colloquia may be applied to this required in consultation with the track coordinator.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEB 5601</td>
<td>Limnology (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EEB 8601</td>
<td>Introduction to Stream Restoration (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EEB 8602</td>
<td>Stream Restoration Practice (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>ENT 5361</td>
<td>(Inactive) (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FNRM 5114</td>
<td>Hydrology and Watershed Management (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FNRM 5153</td>
<td>Forest Hydrology &amp; Watershed Biogeochemistry (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FW 4401</td>
<td>Fish Physiology and Behavior (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FW 5003</td>
<td>Human Dimensions of Biological Conservation (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FW 5136</td>
<td>Ichthyology (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FW 8459</td>
<td>Stream and River Ecology (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>FW 8465</td>
<td>Fish Habitats and Restoration (3.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>

**Electives (6 to 16 credits)**
Plan A students select at least 6 credits, and Plan B students select at least 16 credits from the following list. Other 5- or 8-level courses can be applied to this requirement in consultation with the advisory committee.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APEC 5151</td>
<td>Applied Microeconomics: Firm and Household (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EEB 5042</td>
<td>Quantitative Genetics (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EEB 5409</td>
<td>Evolution (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EEB 5609</td>
<td>Ecosystem Ecology (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>ENT 5011</td>
<td>Insect Structure and Function (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>ENT 5041</td>
<td>Insect Ecology (3.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>
Wildlife Ecology and Management

The Wildlife Ecology and Management track is available for students wishing to emphasize this concentration within the conservation sciences degree. The track provides structure and oversight for students interested in the ecology and management of both game and non-game wildlife species. The track name will be posted to the transcript, and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in wildlife ecology & management.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Requests for admission to the track may be made during the application process or at any time after the student is admitted to conservation sciences. Students who designate this track will be expected to work closely with their Student Advisory Committee (SAC) to develop an appropriate course of study.

Electives (12 to 22 credits)

Plan A students select at least 12 credits, and Plan B students select at least 22 credits from the following list. Other 5- or 8-level courses can be applied to this requirement in consultation with the advisory committee.

- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5409 - Evolution (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5041 - Insect Ecology (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- LA 5202 - Landscape Analysis Workshop (1.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5253 - [inactive](3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
Twin Cities Campus

Conservation Sciences Minor
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 135 B Skok Hall, 2003 Upper Buford Circle, St. Paul, MN 55108 (612-624-7751)
Email: conssci@umn.edu
Website: http://www.conssci.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The conservation sciences (CS) program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select a named track, fisheries and aquatic biology, which offers an aquatic specialization. Students may also pursue a joint degree in law and conservation biology through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Core Course
FW 8452 - Conservation Biology (3.0 cr)
Seminar
CONS 8001 - Conservation Biology Seminar (1.0 cr)
Electives
Three credits of electives in consultation with the director of graduate studies.

Doctoral
Core Course
FW 8452 - Conservation Biology (3.0 cr)
Seminar
2 credits required including at least one credit of CBIO 8001.
Take 2 or more credit(s) from the following:
- CONS 8001 - Conservation Biology Seminar (1.0 cr)
- FW 8200 - Seminar (1.0 - 4.0 cr)

Electives
7 credits of electives in consultation with the director of graduate studies.
Twin Cities Campus
Conservation Sciences Ph.D.
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 135 B Skok Hall, 2003 Upper Buford Circle, St. Paul, MN 55108 (612-624-7751)
Email: conssci@umn.edu
Website: http://www.conssci.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The conservation sciences (CS) program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select one of three tracks, conservation science track or fisheries and aquatic biology track or wildlife ecology and management track. Students may also pursue a joint degree in law and conservation sciences through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
A BS/BA degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but these individuals may be required to take selected courses in biology. In general, PhD applicants holding a baccalaureate degree are first expected to complete a master's degree.

Special Application Requirements:
A statement of career goals and three letters of recommendation evaluating the applicant's potential for graduate study are required. Three letters of recommendation are required. TOEFL is required for applicants who speak English as a second language. Applicants to the joint law degree program must also apply to the Law School. Application deadline is January 1. Typically, students are admitted only for fall semester.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students are expected to show competency in both the biological and social sciences. With their advisory committee, students develop a program that emphasizes the ecological and social aspects of conservation. Dissertation research may require proficiency in supporting areas (e.g., statistics, computing, communications).

Core Courses
Take following core courses:
- FW 8452 - Conservation Biology (3.0 cr)
- CONS 8095 - Contemporary Problems in Conservation Biology (1.0 cr)

Seminar Requirement
Take CONS 8001 3 times. Students pursuing the FAB track may substitute up to 2 semesters of FW 8200 toward this requirement.

Take 3 or more credit(s) from the following:
- CONS 8001 - Conservation Biology Seminar (1.0 cr)
- FW 8200 - Seminar (1.0 - 4.0 cr)

Statistics Requirement
Select at least 3 credits from the following. Other coursework can be applied to this requirement with advisor and/or SAC approval.

Take 3 or more credit(s) from the following:
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)

Thesis Credits
Take 24 thesis semester credits
- CONS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework:
Joint degree in conservation sciences and law
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Conservation Science
Conservation science track is available for MS, PhD, and joint degree students wishing to emphasize this concentration within a conservation sciences. This track name will be indicated on the student's transcript. This track provides structure and oversight for...
students interested in the interface of population, species, and ecosystem biology with disciplines of social sciences, education, economics.

**Conservation Science - Electives**

Doctoral students should take a minimum of 14 credits from the following list, or choose 5- or 8-xxx level courses from other departments in consultation with SAC to meet minimum credit requirements.

Take 14 or more credit(s) from the following:

- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5409 - Evolution (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ENT 4021 - Honey Bees and Insect Societies (3.0 cr)
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5041 - Insect Ecology (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- FW 5401 - Fish Physiology and Behavior (3.0 cr)
- FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
- FW 5625 - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
- GEOG 8280 - Biogeography (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8102 - Practicum for Future Faculty (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
- ISG 5020 - Risk Analysis for Introduced Species and Genotypes (1.0 cr)
- ISG 5021 - Problem Solving Practicum in Risk Analysis (3.0 cr)
- ISG 8031 - Cooperative Learning Practicum (1.0 cr)
- LA 5202 - Landscape Analysis Workshop (1.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5253 - Strategic Planning and Management (3.0 cr)
- PA 5501 - Theories and Policies of Development (3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

**Fisheries and Aquatic Biology**

Three-quarters of the global ecosystem is water and most is a global commons. Many biologists and economists argue that freshwater is one of the most critical global resources and that the functional integrity and biodiversity within freshwater and marine ecosystems are highly threatened. The fisheries and aquatic biology (FAB) track is available for MS, PhD, and joint degree students wishing to emphasize this concentration within a CS major. The track name will be indicated on the student's transcript and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in fisheries or aquatic biology. Combined with a typical undergraduate degree in biology or natural resource science, careful selection of courses in the graduate program will satisfy the educational requirements for professional certification by the American Fisheries Society.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Request for admission to the track may be made during the application process or any time after the student is admitted to the CS graduate program. Students in the track must meet all requirements for the PhD in CS.

Students who designate this track will be expected to work closely with their Student Advisory Committee (SAC) to develop an appropriate course of study. The track coordinator will review each student's academic program to examine how track expectations are met and forward it with a recommendation to the director of graduate studies for approval.

**Fisheries and Aquatic Biology - Required Courses**
In addition to course requirements for the conservation sciences major, PhD students in fisheries and aquatic biology track are required to take minimum of 8 semester credits from following list. Other advanced courses or colloquia on fisheries or aquatic biology that are not listed here may also satisfy needs of students in the track. Please check with FAB track coordinator to add other courses.

Take 8 or more credit(s) from the following:
- EEB 5601 - Limnology (3.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- ENT 5361 (Inactive) (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- FW 4401 - Fish Physiology and Behavior (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- FW 5136 - Ichthyology (4.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)

**Fisheries and Aquatic Biology - Electives**

PhD students should take a minimum of 6 semester credits either from the following list, or choose 5- or 8-xxxx courses from other departments in consultation with the advisor and/or SAC.

Take 6 or more credit(s) from the following:
- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5409 - Evolution (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5041 - Insect Ecology (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- FW 5401 - Fish Physiology and Behavior (3.0 cr)
- FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
- FW 5625 - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
- GEOG 8280 - Biogeography (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8102 - Practicum for Future Faculty (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
- ISG 5020 (Inactive) (1.0 cr)
- ISG 8021 - Problem Solving Practicum in Risk Analysis (3.0 cr)
- ISG 8031 - Cooperative Learning Practicum (1.0 cr)
- LA 5202 - Landscape Analysis Workshop (1.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5253 (Inactive) (3.0 cr)
- PA 5501 - Theories and Policies of Development (3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

**Wildlife Ecology and Management**

The Wildlife Ecology and Management track is available for students wishing to emphasize this concentration within the conservation sciences degree. The track provides structure and oversight for students interested in the interface of population, species, and ecosystem biology with the disciplines of social sciences, education, and economics. The track name will be posted to the transcript, and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in wildlife ecology and management.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Requests for admission to the track may be made during the application process or at any time after the student is admitted to conservation sciences. Students in the track must meet all MS degree requirements. Students who designate this track will be expected to work closely with their Student Advisory
Committee (SAC) to develop an appropriate course of study. The track coordinator will review each student's academic program to examine how track expectations are met and forward it with a recommendation to the director of graduate studies for approval.

**Wildlife Ecology & Management - Electives**

Doctoral students should take a minimum of 14 credits from the following list, or choose 5- or 8-xxx level courses from other departments in consultation with SAC to meet minimum credit requirements.

Take 14 or more credit(s) from the following:

- **APEC 5151** - Applied Microeconomics: Firm and Household (3.0 cr)
- **EEB 4129** - Mammalogy (4.0 cr)
- **EEB 4134** - Introduction to Ornithology (4.0 cr)
- **EEB 5042** - Quantitative Genetics (3.0 cr)
- **EEB 5409** - Evolution (3.0 cr)
- **EEB 5601** - Limnology (3.0 cr)
- **EEB 5609** - Ecosystem Ecology (3.0 cr)
- **ENT 4021** - Honey Bees and Insect Societies (3.0 cr)
- **ENT 5011** - Insect Structure and Function (4.0 cr)
- **ENT 5041** - Insect Ecology (3.0 cr)
- **EPSY 5221** - Principles of Educational and Psychological Measurement (3.0 cr)
- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **FNRM 5104** - Forest Ecology (4.0 cr)
- **FNRM 5114** - Hydrology and Watershed Management (3.0 cr)
- **FNRM 5131** - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- **FNRM 5203** - Forest Fire and Disturbance Ecology (3.0 cr)
- **FNRM 5204** - Landscape Ecology and Management (3.0 cr)
- **FNRM 5262** - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- **FW 5003** - Human Dimensions of Biological Conservation (3.0 cr)
- **FW 5051** - Analysis of Populations (4.0 cr)
- **FW 5401** - Fish Physiology and Behavior (3.0 cr)
- **FW 5603W** - Habitats and Regulation of Wildlife [WI] (3.0 cr)
- **FW 5625** - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
- **GRAD 8280** - Biogeography (3.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)
- **GRAD 8102** - Practicum for Future Faculty (3.0 cr)
- **HORT 5071** - Ecological Restoration (4.0 cr)
- **ISG 5010** - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
- **ISG 5020** *(Inactive)* (1.0 cr)
- **ISG 8021** - Problem Solving Practicum in Risk Analysis (3.0 cr)
- **ISG 8031** - Cooperative Learning Practicum (1.0 cr)
- **LA 5202** - Landscape Analysis Workshop (1.0 cr)
- **LA 5204** - Metropolitan Landscape Ecology (3.0 cr)
- **PA 5251** - Strategic Planning and Management (3.0 cr)
- **PA 5253** *(Inactive)* (3.0 cr)
- **PA 5501** - Theories and Policies of Development (3.0 cr)
- **PA 5511** - Community Economic Development (3.0 cr)
- **VMED 5181** - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
Twin Cities Campus
Entomology M.S.
Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Avenue, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Preferred GPA for prior graduate work is 3.50.

Other requirements to be completed before admission:
A bachelor's degree with a major in a biological science is a prerequisite. Preference is given to students with a broad background in the basic sciences. Admission depends primarily on applicant's undergraduate record, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements:
Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, and objectives, and a diversity statement. Three letters of recommendation are required from persons well acquainted with the student's academic record.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: 1-3 project reports as directed by the advisor and the advisory committee.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must accumulate 2 written examination points.

Required Coursework (11 credits)
Take the following courses:
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5021 - Insect Biodiversity and Evolution (4.0 cr)
- ENT 5041 - Insect Ecology (3.0 cr)

Electives (8 to 18 credits)
Plan A students select 8 credits, and Plan B students select 13 to 18 credits of ENT or non-ENT elective coursework in consultation with the advisor.

Plan Options

Plan A
- Graduate Seminar (1 credit)
  Take at least 1 credit of ENT 8300.
  ENT 8300 - Graduate Seminar (1.0 - 2.0 cr)

- Thesis Credits
  Take at least 10 master's thesis credits.
  ENT 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
  -OR-

Plan B
- Take 1 to 6 credits, as needed to complete the 30-credit minimum, in consultation with the advisor.
  ENT 5910 - Special Problems in Entomology (1.0 - 6.0 cr)
Twin Cities Campus
Entomology Minor
Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Ave, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Courses are chosen in consultation with the student's major advisor and the Entomology director of graduate studies.

Master's Course List
Take at least six credits from the following:
ENT 4xxx
ENT 5xxx
ENT 8xxx

Doctoral
Courses are chosen in consultation with the student's major advisor and the Entomology director of graduate studies.

Doctoral Course List
Take at least 12 credits from the following:
ENT 4xxx
ENT 5xxx
ENT 8xxx
Twin Cities Campus
Entomology Ph.D.
Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Avenue, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A GPA of 3.00 on a 4.00 scale. Students should have a firm background in biology, with fundamentals of mathematics, physics, and chemistry.

Preferred GPA for prior graduate work is 3.50 on a 4.00 scale.

Other requirements to be completed before admission:
A bachelor's degree with a major in a biological science is a prerequisite. Preference is given to students with a broad background in the basic sciences. Admission depends primarily on applicant's undergraduate record, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements:
Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, objectives and a diversity statement. Three letters of recommendation are required from persons well acquainted with the student's academic record.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: 1-3 project reports as directed by the advisor and the advisory committee.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must accumulate 3 written examination points.

Core Courses (11 credits)
Take the following courses:
ENT 5021 - Insect Biodiversity and Evolution (4.0 cr)
ENT 5011 - Insect Structure and Function (4.0 cr)
ENT 5041 - Insect Ecology (3.0 cr)

Seminar (2 credits)
Take 2 credits of the following:
ENT 8300 - Graduate Seminar (1.0 - 2.0 cr)

Electives (11 credits)
Select 11 credits of ENT or non-ENT elective coursework in consultation with the advisor.

Thesis Credits
Take 24 doctoral thesis credits.
ENT 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Food Science M.S.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition
1334 Eckles Avenue
Suite 225
Saint Paul, MN 55108
612-624-6753
Email: fsgrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/food-science-graduate-program

- Program Type: Master’s
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food.

Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing.

Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Students may spend a maximum of five (5) years in this degree program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program are required to hold a bachelor’s degree or its international equivalent in any field.

Other requirements to be completed before admission:
Applicants to the program are required to have completed the following undergraduate-level classes with a final grade of C- or higher before the first day of their intake semester:

- General Chemistry (with lab)
- Organic Chemistry (with lab)
- Physics (with lab)
- Biology (with lab)
- Calculus

If preparation appears inadequate, certain additional courses may be required after admission.

Special Application Requirements:
Applicants advancing to the second round of application review (admissible applicants) are expected to secure a faculty advisor prior to admission.

Only applicants who have secured an advising agreement shall be recommended to the University of Minnesota Graduate School for
formal admission to the Food Science MS Program.

Applicants must submit their test score(s) from the following:
- **GRE**

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language
Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A**: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B**: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project**: The Plan B project is equivalent to 120 hours of work. It should consist of one of the following options, intended to familiarize Plan B students with the tools of scholarship in the field and serving to demonstrate the ability to work independently:

1) The student prepares one paper equivalent to the requirement of 120 hours in one advanced-level course, over and above the normal course requirement, as approved by the course instructor and in consultation with their advisor. This course must be from the major field of interest.

- or -

2) The student prepares one paper equivalent to the requirement of 120 hours in some related field or course as approved by the course instructor and in consultation with their adviser.

- or -

3) The student demonstrates the equivalent to the requirement of 120 hours of library or laboratory research and writes a research report as approved by the adviser. This may take the form of a research proposal.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Up to 9 credits of 4xxx-level courses are allowed.

**Required Courses**

All students take the following required courses for 11 credits:
- **FSCN 4112** - Food Chemistry and Functional Foods (3.0 cr)
- **FSCN 4121** - Food Microbiology (3.0 cr)
- **FSCN 4332** - Food Processing Operations (3.0 cr)
- **FSCN 8318** - Current Issues in Food Science (2.0 cr)

Take one of the following courses for a total of 2 to 4 credits:
- **FSCN 5131** - Food Quality for Graduate Credit (3.0 cr)
or FSCN 5312 - Food Analysis (4.0 cr)
or If FSCN 5122 is taken, FSCN 5123 must also be taken
FSCN 5122 - Food Fermentations and Biotechnology (2.0 cr)
FSCN 5123 - Molecular Biology for Applied Scientists (1.0 cr)
Food Science Elective
Take at least 3 additional FSCN credits, in consultation with the adviser.
FSCN 5xxx
or FSCN 8xxx
General Elective
Choose remaining credits in consultation with the adviser to meet minimum credit requirements.

Plan Options

Plan A
Take 10 master's thesis credits.
FSCN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
-OR-

Plan B
Plan B students do not have additional requirements.
Twin Cities Campus

Food Science Minor

Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition
225 Food Science and Nutrition Building
1334 Eckles Avenue, Saint Paul, MN 55108
612-624-6753
Email: fscngrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/food-science-graduate-program

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing.

Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Food Science director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All courses graded both A-F and S/N must be taken on the A-F grade basis, with a minimum grade of B-, to be applied to the minor.

Course Requirements (9 credits)
All students take the following courses:
- FSCN 4112 - Food Chemistry and Functional Foods (3.0 cr)
- FSCN 4121 - Food Microbiology (3.0 cr)
- FSCN 4332 - Food Processing Operations (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Additional Coursework (3 credits)
Doctoral students select at least 3 additional credits, in consultation with the Food Science director of graduate studies, to complete the 12-credit minimum.

FSCN 5xxx
FSCN 8xxx
Twin Cities Campus
Food Science Ph.D.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition
1334 Eckles Avenue
Saint Paul, MN 55108
612-624-6753
Email: fsgrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/food-science-graduate-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food.

Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing.

Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent along with demonstrated research ability such as a MS degree or publications.

Other requirements to be completed before admission:
Applicants to the program are required to have completed the following undergraduate-level classes with a final grade of C- or higher before the first day of their intake semester:

- General Chemistry (with lab)
- Organic Chemistry (with lab)
- Physics (with lab)
- Biology (with lab)
- Calculus

If preparation appears inadequate, certain additional courses may be required after admission.

Special Application Requirements:
Applicants advancing to the second round of application review (admissible applicants) are expected to secure a faculty advisor prior to admission.

Only applicants who have secured an advising agreement shall be recommended to the University of Minnesota Graduate School for formal admission to the Food Science PhD Program.
Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All PhD students are required to participate as teaching assistants during their doctoral career.

Required Courses
All students must take the following courses

- FSCN 4112 - Food Chemistry and Functional Foods (3.0 cr)
- FSCN 4121 - Food Microbiology (3.0 cr)
- FSCN 4332 - Food Processing Operations (3.0 cr)
- FSCN 8318 - Current Issues in Food Science (2.0 cr)
- FSCN 5131 - Food Quality for Graduate Credit (3.0 cr)

Course Options
Students must choose one of the following courses.

- FSCN 5122 - Food Fermentations and Biotechnology (2.0 cr)
- FSCN 5312 - Food Analysis (4.0 cr)

General Elective
Students must take at least three (3) credits at the 5xxx or 8xxx level in addition to the courses listed above.

Elective Courses
Students complete additional 5xxx and 8xxx level FSCN courses, in consultation with their advisor, to total at least 24 credits.

- FSCN 5xxx
- FSCN 8xxx

Thesis Credits
Food Science PhD students must take 24 thesis credits.

- FSCN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Land and Atmospheric Science M.S.
Soil, Water, & Climate
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Email: kjarcho@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and atmospheric science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The land and atmospheric science graduate program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

BS degree in a related field of science, or a graduate or professional degree.

Required prerequisites

Basic Sciences
Students are expected to have taken a minimum of four of the following courses (or their equivalent).
- MATH 1271 - Calculus I [MATH] (4.0 cr)
- or MATH 1142 - Short Calculus [MATH] (4.0 cr)
- or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
- PHYS 1101W - Introductory College Physics I [PHYS, WI] (4.0 cr)
- PHYS 1102W - Introductory College Physics II [PHYS, WI] (4.0 cr)
- or ESPM 3131 - Environmental Physics (3.0 cr)
- or BIOL 1009 - General Biology [BIOL] (4.0 cr)
- or CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
- CHEM 1062 - Chemical Principles I Laboratory [PHYS] (3.0 cr)
- CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
- or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

Environmental Sciences
Students are expected to have taken a minimum of two of the following (or similar) courses:
Take 2 - 6 course(s) from the following:
- ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
- ESPM 1425 - Introduction to Weather and Climate [PHYS, ENV] (4.0 cr)
- SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
- ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
- ESPM 9612W - Soil and Environmental Biology [WI] (4.0 cr)
or MICB 3301 - Biology of Microorganisms (5.0 cr)
• EEB 3407 - Ecology (3.0 cr)

Other requirements to be completed before admission:
Student course admission prerequisites are as shown below. Students who are admitted with deficiencies would be provided with a list of courses they are required to take before the completion of their degree. This list would be developed by the directors of graduate studies in consultation with the student’s faculty advisor.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 10 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project typically consists of a technical paper of a topic and length acceptable to the student's advisory committee.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Use of 4xxx-level courses requires advisor and director of graduate studies approval.

Core Courses
Take the following courses:
- LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)
- LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)
- SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)

LAAS and Related Courses
Plan A students must select at least 15 credits (9 major credits and 6 related fields) from this list, and Plan B students must select at least 25 credits (15 major credits and 10 related fields). Courses are selected based on relevance to research interests and with the consent of the advisor.

Take 15 - 25 credit(s) from the following:
- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 5272</td>
<td>Applied Biostatistics</td>
<td>4.0 cr</td>
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<tr>
<td>CEGE 4502</td>
<td>Water and Wastewater Treatment</td>
<td>3.0 cr</td>
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<td>CEGE 4562</td>
<td>Environmental Remediation Technologies</td>
<td>3.0 cr</td>
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<td>CEGE 5180</td>
<td>Special Topics</td>
<td>1.0 - 4.0 cr</td>
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<td>CEGE 5511</td>
<td>Urban Hydrology and Water Quality</td>
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<td>CEGE 5541</td>
<td>Environmental Water Chemistry</td>
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<td>CEGE 5542</td>
<td>Experimental Methods in Environmental Engineering</td>
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<td>CEGE 5543</td>
<td>Introductory Environmental Fluid Mechanics</td>
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<td>CEGE 5551</td>
<td>Environmental Microbiology</td>
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<td>CEGE 8501</td>
<td>Environmental Fluid Mechanics I</td>
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<td>CEGE 8502</td>
<td>Environmental Fluid Mechanics II</td>
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<td>CEGE 8503</td>
<td>Environmental Mass Transport</td>
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<td>CEGE 8506</td>
<td>Stochastic Hydrology</td>
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<td>CEGE 8521</td>
<td>The Atmospheric Boundary Layer</td>
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<td>CEGE 8541</td>
<td>Aquatic Chemistry</td>
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<td>CEGE 8542</td>
<td>Chemistry of Organic Pollutants in Environmental Systems</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 8551</td>
<td>Environmental Microbiology: Molecular Theory and Methods</td>
<td>3.0 cr</td>
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<td>CEGE 8561</td>
<td>Analysis and Modeling of Aquatic Environments I</td>
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<tr>
<td>CEGE 8562</td>
<td>Analysis and Modeling of Aquatic Environments II</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 8572</td>
<td>Computational Environmental Fluid Dynamics</td>
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<td>EEB 4068</td>
<td>Plant Physiological Ecology</td>
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<td>EEB 4611</td>
<td>Biogeochemical Processes</td>
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<td>EEB 5053</td>
<td>Ecology: Theory and Concepts</td>
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<td>EEB 5601</td>
<td>Limnology</td>
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<td>ENT 5126</td>
<td>Spatial and Temporal Analysis of Ecological Data</td>
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<td>ESCI 5102</td>
<td>Climate Change and Human History</td>
<td>3.0 cr</td>
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<td>ESCI 5402</td>
<td>Science and Politics of Global Warming</td>
<td>3.0 cr</td>
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<tr>
<td>ESCI 8401</td>
<td>Aqueous Environmental Geochemistry</td>
<td>3.0 cr</td>
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<td>ESCI 8801</td>
<td>Geomicrobiology</td>
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<td>ESPM 5061</td>
<td>Water Quality and Natural Resources</td>
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<td>ESPM 5071</td>
<td>Ecological Restoration</td>
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<td>ESPM 5111</td>
<td>Hydrology and Water Quality Field Methods</td>
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<td>ESPM 5245</td>
<td>Sustainable Land Use Planning and Policy</td>
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<td>ESPM 5402</td>
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<td>FNRM 5114</td>
<td>Hydrology and Watershed Management</td>
<td>3.0 cr</td>
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<tr>
<td>FNRM 5131</td>
<td>Geographical Information Systems (GIS) for Natural Resources</td>
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<td>FNRM 5185</td>
<td>Forest Hydrology &amp; Watershed Biogeochemistry</td>
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<tr>
<td>FNRM 5262</td>
<td>Remote Sensing and Geospatial Analysis of Natural Resources and Environment</td>
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<td>FW 8459</td>
<td>Stream and River Ecology</td>
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<td>Geography of Environmental Systems and Global Change [ENV, WI]</td>
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<td>GEOG 5426</td>
<td>Climatic Variations</td>
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<td>GEOG 5531</td>
<td>Numerical Spatial Analysis</td>
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<td>GEOG 5541</td>
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<td>3.0 cr</td>
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<td>GEOG 5562</td>
<td>GIS Development Practicum</td>
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<tr>
<td>GEOG 5839</td>
<td>Seminar: Climatology (Inactive)</td>
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<td>LAAS 5311</td>
<td>Soil Chemistry and Mineralogy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>LAAS 5416</td>
<td>Precision Agriculture and Nutrient Management</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>LAAS 5425</td>
<td>Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere</td>
<td>3.0 cr</td>
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<tr>
<td>LAAS 5426</td>
<td>Atmospheric Processes II: Radiation, Composition, and Climate</td>
<td>3.0 cr</td>
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<tr>
<td>LAAS 5480</td>
<td>Special Topics in Land and Atmospheric Science</td>
<td>1.0 - 4.0 cr</td>
</tr>
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<td>LAAS 5515</td>
<td>Soil Formation: Earth Surface Processes and Biogeochemistry</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>LAAS 5621</td>
<td>Environmental Genomics and Microbiomes</td>
<td>3.0 cr</td>
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<td>LAAS 6195</td>
<td>Research Problems in Soils</td>
<td>1.0 - 5.0 cr</td>
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<td>NR 5021</td>
<td>Statistics for Agricultural and Natural Resource Professionals</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PLPA 5303</td>
<td>Data Visualization in Plant and Microbial Biology</td>
<td>3.0 cr</td>
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<td>Plant-Microbe Interactions</td>
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<td>PMB 4111</td>
<td>Microbial Physiology and Diversity</td>
<td>3.0 cr</td>
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<td>PMB 5412</td>
<td>Plant Physiology and Development</td>
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<tr>
<td>PUBH 6100</td>
<td>Topics: Environmental Health</td>
<td>1.0 - 4.0 cr</td>
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<td>PUBH 6190</td>
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<td>Colloquium in Sustainable Agriculture</td>
<td>2.0 cr</td>
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<td>SOIL 5232</td>
<td>Vadose Zone Hydrology</td>
<td>3.0 cr</td>
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<tr>
<td>SOIL 5555</td>
<td>Wetland Soils</td>
<td>3.0 cr</td>
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<tr>
<td>SOIL 5611</td>
<td>Soil Biology and Fertility</td>
<td>4.0 cr</td>
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</table>
• SOIL 5993 - Directed Study (1.0 - 4.0 cr)
• SOIL 8252 - Advanced Soil Physics (2.0 cr)
• SOIL 8510 - Advanced Topics in Pedology (2.0 - 4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• WRS 5101 - Water Policy (3.0 cr)

Plan Options

Plan A
Take 10 master's thesis credits.
LAAS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Land and Atmospheric Science Minor
Soil, Water, & Climate
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Email: kiarcho@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and atmospheric science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and Atmospheric Science graduate program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

B.S. degree in a related science field.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Land and Atmospheric Science director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All minor courses must be taken A-F, unless approved by the Graduate Advisory Committee, or if they are offered on the S-N basis only. Courses for use in the minor must be selected with the consultation of the LAAS graduate faculty member serving as the minor advisor and approved by the LAAS director of graduate studies.

Required Course (3 credits)
Take the following course:
LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)
Electives (6 to 9 credits)

Masters students select 6 credits, and doctoral students select 9 credits to complete minimum credit requirements. Other courses can be applied to this requirement with approval of the LAAS advisor and LAAS director of graduate studies.

LAAS 5051 - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
LAAS 5416 - Precision Agriculture and Nutrient Management (3.0 cr)
LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
LAAS 5480 - Special Topics in Land and Atmospheric Science (1.0 - 4.0 cr)
LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans.

Masters

Doctoral
Twin Cities Campus
Land and Atmospheric Science Ph.D.
Soil, Water, & Climate
College of Food, Agricultural and Natural Resource Sciences

Contact Information:
Department of Soil, Water, and Climate, 439 Borlaug Hall, 191 Upper Buford Circle, St. Paul, MN 55108 (612-625-5251; fax: 612-625-2208)
Email: laas@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 50
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and atmospheric science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and atmospheric science graduate program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Applicants to the LAAS PhD program are expected to have an MS degree or equivalent in a related field of science.

Required prerequisites
Basic Sciences
Students are expected to have taken a minimum of four of the following courses (or their equivalent):
- MATH 1271 - Calculus I [MATH] (4.0 cr)
- or MATH 1142 - Short Calculus [MATH] (4.0 cr)
- or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
- PHYS 1101W - Introductory College Physics I [PHYS, WI] (4.0 cr)
- PHYS 1102W - Introductory College Physics II [PHYS, WI] (4.0 cr)
- or ESPM 3131 - Environmental Physics (3.0 cr)
- or BIOL 1009 - General Biology [BIOL] (4.0 cr)
- or CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
- CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)
- CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
- CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
- or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

Environmental Sciences
Students are expected to have taken a minimum of two of the following (or similar) courses:
Take 2 - 6 course(s) from the following:
- ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
- ESPM 1425 - Introduction to Weather and Climate [PHYS, ENV] (4.0 cr)
- SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
- ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
- ESPM 3612W - Soil and Environmental Biology [WI] (4.0 cr)
Other requirements to be completed before admission: Students with a BS degree and outstanding scholarship can request direct admission to the LAAS PhD program. Each request will be considered on a case-by-case basis by the Graduate Advisory Committee. Evidence of outstanding scholarship may include: peer-reviewed publications, a pre-doctoral fellowship, a National Science Foundation PhD Fellowship, high GPA/GRE scores, or strong previous research experience. Current MS candidates who exhibit outstanding scholarship may request transfer to a PhD degree program after completion of their first two semesters of coursework.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

16 credits are required in the major.
10 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Core Courses**

All doctoral students must complete the 10-credit core curriculum.

Take exactly 5 course(s) totaling exactly 10 credit(s) from the following:

- **LAAS 5050** - Integrated Topics in Land & Atmospheric Science (3.0 cr)
- **LAAS 8128** - Land and Atmospheric Science Seminar (1.5 cr)
- **SOIL 8123** - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- **LAAS 5051** - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)

**LAAS and Related Courses**

Choose courses relevant to particular area of research with consent of advisor. Take at least 6 credits from the following list to complete the 16-credit minimum for the major, and at least 10 credits for the supporting program minimum.

Take 16 or more credit(s) from the following:

- **AGRO 4505** - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- **AGRO 4605** - Strategies for Agricultural Production and Management (3.0 cr)
- **AGRO 5121** - Applied Experimental Design (4.0 cr)
- **AGRO 5311** - Research Methods in Crop Improvement and Production (1.0 cr)
- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- **APEC 5831** - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- **BBE 5535** - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- **BBE 5608** - Environmental and Industrial Microbiology (3.0 cr)
- **BIOL 5272** - Applied Biostatistics (4.0 cr)
• CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
• CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
• CEGE 5180 - Special Topics (1.0 - 4.0 cr)
• CEGE 5511 - Urban Hydrology and Water Quality (4.0 cr)
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
• CEGE 5543 - Introductory Environmental Fluid Mechanics (4.0 cr)
• CEGE 5551 - Environmental Microbiology (3.0 cr)
• CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
• CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
• CEGE 8503 - Environmental Mass Transport (4.0 cr)
• CEGE 8506 - Stochastic Hydrology (4.0 cr)
• CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
• CEGE 8541 - Aquatic Chemistry (3.0 cr)
• CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
• CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
• CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
• CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
• CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
• EEB 4068 - Plant Physiological Ecology (3.0 cr)
• EEB 4611 - Biogeochemical Processes (3.0 cr)
• EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
• ESCI 5102 - Climate Change and Human History (3.0 cr)
• ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
• ESPM 8401 - Aquatic Environmental Geochemistry (3.0 cr)
• ESC 8801 - Geomicrobiology (3.0 cr)
• ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5402 - Biometeorology (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
• FEN 8459 - Stream and River Ecology (3.0 cr)
• GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
• GEOG 5426 - Climatic Variations (3.0 cr)
• GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
• GEOG 5541 - Principles of Geocomputing (3.0 cr)
• GEOG 5562 - GIS Development Practicum (3.0 cr)
• GEOG 5839 [Inactive] (3.0 cr)
• GEOG 8270 - Seminar: Climatology (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• LAAS 5416 - Precision Agriculture and Nutrient Management (3.0 cr)
• LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
• LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
• LAAS 5480 - Special Topics in Land and Atmospheric Science (1.0 - 4.0 cr)
• LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
• LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
• LAAS 5893 - Research Problems in Soils (1.0 - 5.0 cr)
• NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
• PLPA 5303 - Data Visualization in Plant and Microbial Biology (3.0 cr)
• PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
• PMB 4111 - Microbial Physiology and Diversity (3.0 cr)
• PMB 5412 - Plant Physiology and Development (3.0 cr)
• PUBH 6100 - Topics: Environmental Health (1.0 - 4.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)
• SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
• SOIL 5232 - Vadose Zone Hydrology (3.0 cr)
• SOIL 5555 - Wetland Soils (3.0 cr)
• SOIL 5611 - Soil Biology and Fertility (4.0 cr)
• SOIL 5993 - Directed Study (1.0 - 4.0 cr)
• SOIL 8252 - Advanced Soil Physics (2.0 cr)
• SOIL 8510 - Advanced Topics in Pedology (2.0 - 4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• WRS 5101 - Water Policy (3.0 cr)

Thesis credits
Take 24 or more credit(s) from the following:
• LAAS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Natural Resources Science and Management M.S.
Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 116d Green Hall, 1530 Cleveland Avenue N, St. Paul MN 55108 (612-624-7683; fax: 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the natural resources science and management program may emphasize one of the following tracks, or develop an individualized plan of study: 1) forests: biology, ecology, conservation, and management; 2) economics, policy, management, and society; 3) assessment, monitoring, and geospatial analysis; 4) recreation resources, tourism, and environmental education; 5) forest hydrology and watershed management; 6) tribal natural resources; 7) forest products; or 8) paper science and engineering.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Most admitted students have earned degrees in natural resource-related majors. Applicants with exceptional academic records but no related background are eligible; if admitted, they may complete the prerequisites for advanced courses during the early stages of their graduate program. These prerequisites will vary depending upon the student's track and major advisor.

Applicants will not be admitted unless a member of the program faculty agrees to advise them ahead of time. This decision depends on admissibility (the applicant's overall credentials), mutual research interests, and the faculty member's ability to take on a new student. Some faculty members will not advise students unless they have funding for the student. Applicants are encouraged to review faculty profiles on the program website and begin making contacts prior to and during the application process.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B project(s) is(are) designed in consultation with the student’s advisor and committee. It(They) must develop and demonstrate competence in the student’s track. Students must present a seminar on the Plan B project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The MS is offered under Plan A (with thesis) and Plan B (without thesis). Plan A students usually design a program to support their specific thesis project. In consultation with faculty members, Plan B students design a program that develops competence in at least one track. Students present a seminar on the thesis or the Plan B project. Specific requirements vary by track and research project; prospective students should contact the director of graduate studies or a prospective faculty advisor for specific information. Students must also receive training in the ethical conduct of research and present a formal seminar to faculty and peers. This presentation is separate from the final exam seminar.

Required Orientation (1 credit)
NR 8101 - Natural Resources Science and Management Orientation (1.0 cr)

Required Seminar (1 credit)
NR 8107 - Seminar: Natural Resources Science and Management (1.0 cr)

Required Coursework Plan A (18 credits)
Students work with committee to develop a program of coursework that meets their needs. Specific tracks & suggested courses are listed below. Students may choose to develop an individualized plan of study from courses listed below.

Courses not on these lists require approval. All courses must be approved by the NRSM Graduate Studies Committee. Plan A students usually design a program to support their specific thesis project. Students present a seminar on their thesis.

Thesis for Plan A (10 credits)
NR 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Required Coursework Plan B (28 credits)
Students work with committee to develop a program of coursework that meets their needs. Specific tracks & suggested courses are listed below. Students may choose to develop an individualized plan of study from courses listed below.

Courses not on these lists require approval. All courses must be approved by the NRSM Graduate Studies Committee. Plan B students design a program that develops competence in their chosen field of study.

Joint- or Dual-degree Coursework: Law, Science & Technology Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Assessment, Monitoring, and Geospatial Analysis
Addresses measurements and related technology applications and resource analysis. Graduate students in this track may choose to specialize in topics such as: geographic information systems (GIS); remote sensing; geospatial analysis; survey design (include forest inventory and monitoring), measurement, modeling; and biometrics. Studies typically focus on landscape, region, or global levels.

Assessment, Monitoring, and Geospatial Analysis - Suggested Course List (18 - 28 Credits)
Plan A students must enroll in 18 coursework credits in addition to their orientation, seminar, and thesis credit requirements; Plan B students must enroll in 28 coursework credits in addition to orientation, seminar, and thesis credit requirements. Students may elect to take courses outside of this list if advised to do so.
AGRO 5121 - Applied Experimental Design (4.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
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<td>APEC 5032</td>
<td>Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)</td>
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<td>APEC 8211</td>
<td>Econometric Analysis I (2.0 cr)</td>
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<td>APEC 8212</td>
<td>Econometric Analysis II (2.0 cr)</td>
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<td>BIOL 8100</td>
<td>Improvisation for Scientists (1.0 cr)</td>
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<td>CEGE 5541</td>
<td>Environmental Water Chemistry (3.0 cr)</td>
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<td>CEGE 8511</td>
<td>Mechanics of Sediment Transport (3.0 cr)</td>
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<td>CI 8149</td>
<td>Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)</td>
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<td>CSCI 5302</td>
<td>Analysis of Numerical Algorithms (3.0 cr)</td>
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<td>CSCI 5707</td>
<td>Principles of Database Systems (3.0 cr)</td>
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<td>DES 8103</td>
<td>Qualitative and Mixed Methods Research (3.0 cr)</td>
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Information current as of November 07, 2022
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**Economics, Policy, Management, and Society**

For students interested in focusing on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Graduate students in this track can specialize in areas such as: economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning. Studies might consider choices, impacts, and tradeoffs in protecting, restoring, developing, and allocating natural and environmental resources. The research conducted by students in this track may address a wide range of issues and problems from local to international in scope.

**Economics, Policy, Management, and Society - Suggested Course List (18-28 Credits)**

Plan A students must enroll in 18 coursework credits in addition to orientation, seminar, and thesis credits, and Plan B students must enroll 28 credits in addition to orientation and seminar. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- APEC 5321 - Regional Economic Analysis (3.0 cr)
- APEC 5721 - Economics of Science and Technology Policy (3.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- APEC 8601 - Natural Resource Economics (3.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CEGE 5570 - Design for Sustainable Development - India (3.0 - 9.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- COMM 5441 - Communication in Human Organizations (3.0 cr)
- COMM 8452 - Seminar: Methods of Intercultural/Diversity Facilitation (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
- ECON 8201 - Econometric Analysis (2.0 cr)
- ECON 8203 - Econometric Analysis (2.0 cr)
- ECON 8204 - Econometric Analysis (2.0 cr)
- EEB 5068 - Plant Physiological Ecology (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
- ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
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- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8256 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESPM 5014 - Tribal and Indigenous Natural Resource Management (3.0 cr)
- ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
- ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
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LA 5576 - Ecological Restoration Project Planning and Management (3.0 cr)
LAW 6062 - Energy Law (3.0 cr)
MGMT 6033 - Strategy Implementation (2.0 cr)
MGMT 6055 - Management of Innovation and Change (2.0 cr)
NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
NR 8100 - Topics in Natural Resources Science and Management (1.0 - 2.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
PA 5002 - Introduction to Policy Analysis (1.5 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5021 - Microeconomics for Policy Analysis (3.0 cr)
PA 5022 - Applications of Economics for Policy Analysis (1.5 - 3.0 cr)
PA 5031 - Statistics for Public Affairs (4.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5122 - Law and Public Affairs (3.0 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5251 - Strategic Planning and Management (3.0 cr)
PA 5253 - (inactive) (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5503 - Economics of Development (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PA 5920 - Skills Workshop (0.5 - 4.0 cr)
PA 6790 - Advanced Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
POL 5315 - State Governments: Laboratories of Democracy (3.0 cr)
POL 8126 - Qualitative Methods (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7407 - Analysis of Categorical Data (3.0 cr)
PUBH 8472 - Spatial Biostatistics (3.0 cr)
SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOIL 5555 - Wetland Soils (3.0 cr)
SOIL 5611 - Soil Biology and Fertility (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
WRS 5101 - Water Policy (3.0 cr)
Forest Hydrology and Watershed Management
Brings together the integrally related areas of earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Graduate students in this track may specialize in areas such as: forest hydrology, water quality, and watershed management. Research would focus on forest, riparian, and wetland ecosystems.

**Forest Hydrology and Watershed Management - Suggested Course List (18 - 28 Credits)**

Plan A students must enroll in 18 coursework credits in addition to orientation, seminar, and thesis credits, and Plan B students must enroll in 28 credits in addition to orientation and seminar. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

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<td>FNRM 5411</td>
<td>Managing Forest Ecosystems: Silviculture</td>
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<td>FNRM 5413</td>
<td>Managing Forest Ecosystems: Silviculture Lab</td>
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<td>FNRM 5431</td>
<td>Timber Harvesting and Road Planning</td>
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<td>FNRM 5462</td>
<td>Advanced Remote Sensing and Geospatial Analysis</td>
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<td>FNRM 5471</td>
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<td>FNRM 5480</td>
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<tr>
<td>FNRM 5501</td>
<td>Urban Forest Management: Managing Greenspaces for People</td>
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<td>FNRM 8101</td>
<td>Research Problems: Physiological Ecology</td>
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<td>FNRM 8102</td>
<td>Research Problems: Forest-Tree Genetics</td>
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<td>Research Problems: Forest Hydrology</td>
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<td>Research Problems: Forest Ecology</td>
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<td>Research Problems: Forest Economics</td>
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<td>FNRM 8106</td>
<td>Research Problems: Urban Forestry--Biology and Management</td>
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<td>Research Problems: Forest Ecosystem Health</td>
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<td>Research Problems: Forest Economics</td>
<td>1.0 - 5.0</td>
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<td>Research Problems: Forest Biometry and Measurements</td>
<td>1.0 - 5.0</td>
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<td>Research Problems: Forest Recreation</td>
<td>1.0 - 5.0</td>
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<td>FNRM 8204</td>
<td>Research Problems: Forest Policy</td>
<td>1.0 - 5.0</td>
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<td>FNRM 8205</td>
<td>Research Problems: Spatial Data Analysis</td>
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<td>FNRM 8206</td>
<td>Research Problems: Forest Management</td>
<td>1.0 - 5.0</td>
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<td>FNRM 8207</td>
<td>Economic Analysis of Natural Resource Projects</td>
<td>1.0 - 5.0</td>
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<td>FNRM 8208</td>
<td>Research Problems: Environmental Learning and Leadership</td>
<td>1.0 - 5.0</td>
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<td>FW 8051</td>
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<td>GIS 5555</td>
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<td>GIS 5577</td>
<td>Spatial Database Design and Administration</td>
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<td>LA 5204</td>
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<td>LAAS 5311</td>
<td>Soil Chemistry and Mineralogy</td>
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<td>LAAS 5416</td>
<td>Precision Agriculture and Nutrient Management</td>
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<td>LAAS 5425</td>
<td>Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere</td>
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<tr>
<td>LAAS 5426</td>
<td>Atmospheric Processes II: Radiation, Composition, and Climate</td>
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<tr>
<td>LAAS 5515</td>
<td>Soil Formation: Earth Surface Processes and Biogeochemistry</td>
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<td>LAW 6062</td>
<td>Energy Law</td>
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<td>NR 5021</td>
<td>Statistics for Agricultural and Natural Resource Professionals</td>
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<tr>
<td>NR 8100</td>
<td>Topics in Natural Resources Science and Management</td>
<td>1.0 - 2.0</td>
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<td>OLPD 5061</td>
<td>Ethnographic Research Methods</td>
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<td>PA 5002</td>
<td>Introduction to Policy Analysis</td>
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<td>PA 5031</td>
<td>Statistics for Public Affairs</td>
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<tr>
<td>PA 5041</td>
<td>Qualitative Methods for Policy Analysts</td>
<td>4.0</td>
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<tr>
<td>PA 5501</td>
<td>Theories and Policies of Development</td>
<td>3.0</td>
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Forest Products
For students who wish to specialize in areas such as: wood and fiber as raw materials; deterioration of wood; wood mechanics and structural design; wood moisture interactions and drying; processing and performance of composites; economics of manufacturing systems; technology and processing of solid wood products; marketing, design, and production of housing components; and energy-efficient building construction.

Forest Products - Suggested Course List (18 - 28 Credits)
Plan A students must enroll in 18 coursework credits in addition to orientation, seminar, and thesis credits, and Plan B students must enroll in 28 credits in addition to orientation and seminar. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

AGRO 5121 - Applied Experimental Design (4.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
BBE 5023 - Process Control and Instrumentation (3.0 cr)
BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
BBE 5402 - Bio-based Products Engineering Lab II (2.0 cr)
BBE 5403 - Bio-based Products Engineering Lab I (2.0 cr)
BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
BBE 5713 - Biological Process Engineering (3.0 cr)
BBE 5733 - Renewable Energy Technologies (3.0 cr)
BBE 8001 - Seminar I (1.0 cr)
BBE 8002 - Seminar II (1.0 cr)
BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
CHEM 4214 - Polymers (3.0 cr)
CHEM 4221 - Introduction to Polymer Chemistry (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 5263 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
ESPM 5071 - Ecological Restoration (4.0 cr)
ESPM 5108 - Ecology of Managed Systems (4.0 cr)
ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
ESPM 5243 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
ESPM 5555 - Wetland Soils (3.0 cr)
ESPM 5575 - Wetlands (3.0 cr)
ESPM 5602 - Regulations and Corporate Environmental Management (3.0 cr)
ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
FNRM 5104 - Forest Ecology (4.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)
FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
FNRM 5204 - Landscape Ecology and Management (3.0 cr)
FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
FNRM 5265 - Drones: Data, Analysis, and Operations (3.0 cr)
FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
FNRM 5471 - Forest Management Planning (3.0 cr)
FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
FNRM 8108 - Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)
FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
FNRM 8207 - Economic Analysis of Natural Resource Projects (1.0 - 5.0 cr)
FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
GIS 5555 - Basic Spatial Analysis (3.0 cr)
LAW 6062 - Energy Law (3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
NR 8100 - Topics in Natural Resources Science and Management (1.0 - 2.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
PA 5002 - Introduction to Policy Analysis (1.5 cr)

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Information current as of November 07, 2022
Forests: Biology, Ecology, Conservation, and Management
Focus on forest resources and allows students to choose from specializations in the following areas: forest biology, ecology, ecophysiology; genetics and tree improvement; tree physiology; reproductive biology and forest regeneration; forest growth and vegetation dynamics; timber harvesting, silviculture, and sustainable forest management; landscape ecology, restoration, and management; conservation of biodiversity and wildlife habitat management; forest health; disturbance (including fire) ecology; urban and community forestry; and agroforestry. Research normally focuses on forest and related ecosystems.

Forests: Biology, Ecology, Conservation, and Management - Suggested Course List (18-28 Credits)
Plan A students must enroll in 18 coursework credits in addition to orientation, seminar, and thesis credits, and Plan B students must enroll in 28 credits in addition to orientation and seminar. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

AGRO 5121 - Applied Experimental Design (4.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
EEB 4609W - Ecosystem Ecology [ENV, WI] (3.0 cr)
EEB 5068 - Plant Physiological Ecology (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
EEB 5609 - Ecosystem Ecology (3.0 cr)
EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
ENT 5051 - Scientific Illustration of Insects (3.0 cr)
ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
ESPM 5071 - Ecological Restoration (4.0 cr)
ESPM 5108 - Ecology of Managed Systems (4.0 cr)
ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
ESPM 5551 - Wetland Soils (3.0 cr)
ESPM 5575 - Wetlands (3.0 cr)
ESPM 5602 - Regulations and Corporate Environmental Management (3.0 cr)
ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
ESPM 5811 - Environmental Interpretation (3.0 cr)
FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
FNRM 5104 - Forest Ecology (4.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
FNRM 5204 - Landscape Ecology and Management (3.0 cr)
FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
FNRM 5222 - Managing Recreational Lands (4.0 cr)
FNRM 5259 - Visitor Behavior Analysis (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
FNRM 5413 - Managing Forest Ecosystems: Silviculture (3.0 cr)
FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
FNRM 5471 - Forest Management Planning (3.0 cr)
FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
FNRM 8108 - Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)
FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
FNRM 8207 - Economic Analysis of Natural Resource Projects (1.0 - 5.0 cr)
FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
FW 8200 - Seminar (1.0 - 4.0 cr)
FW 8452 - Conservation Biology (3.0 cr)
GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
GEOG 5426 - Climatic Variations (3.0 cr)
GEOG 5839 - (Inactive) (3.0 cr)
Paper Science and Engineering
Specializes in areas such as: the chemistry and biotechnology of lignocellulosic materials; material science of paper and fiber products; paper recycling; energy and manufacturing efficiency in the pulp and paper-making process; novel and environmentally friendly pulping and bleaching, transport processes through porous media, surface and colloid science of papermaking; chemical engineering applications in pulp and paper processes; and statistical process control.

Paper Science and Engineering - Suggested Course List (18 - 28 Credits)
Plan A students must enroll in 18 coursework credits in addition to orientation, seminar, and thesis credits, and Plan B students must enroll in 28 credits in addition to orientation and seminar. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

AGRO 5121 - Applied Experimental Design (4.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
BBE 5023 - Process Control and Instrumentation (3.0 cr)
BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
BBE 5305 - Pulp and Paper Technology (3.0 cr)
BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
BBE 5402 - Bio-based Products Engineering Lab II (2.0 cr)
BBE 5403 - Bio-based Products Engineering Lab I (2.0 cr)
BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
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<tr>
<td>BBE 5733</td>
<td>Renewable Energy Technologies (3.0 cr)</td>
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<td>BBE 8001</td>
<td>Seminar I (1.0 cr)</td>
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<td>BBE 8002</td>
<td>Seminar II (1.0 cr)</td>
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<td>BBE 8013</td>
<td>Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)</td>
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<td>BIOL 8100</td>
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<td>CHEM 5210</td>
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<td>Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)</td>
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<td>DES 8103</td>
<td>Qualitative and Mixed Methods Research (3.0 cr)</td>
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<tr>
<td>ENT 5920</td>
<td>Special Lectures in Entomology (1.0 - 4.0 cr)</td>
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<td>ENTR 6041</td>
<td>Initiating New Product Design and Business Development (4.0 cr)</td>
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<td>EPSY 5221</td>
<td>Principles of Educational and Psychological Measurement (3.0 cr)</td>
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<td>Invasive Plants and Animals: Ecology and Management (3.0 cr)</td>
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<td>ESPM 5031</td>
<td>Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)</td>
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<td>ESPM 5061</td>
<td>Water Quality and Natural Resources (3.0 cr)</td>
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<td>Ecological Restoration (4.0 cr)</td>
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<td>ESPM 5242</td>
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<td>Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)</td>
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<td>Research Problems: Forest Economics (1.0 - 5.0 cr)</td>
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<td>Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)</td>
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<tr>
<td>FNRM 8203</td>
<td>Research Problems: Forest Recreation (1.0 - 5.0 cr)</td>
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</table>
Recreation Resources, Tourism, and Environmental Education

Focuses on the use and management of natural resources for recreation and tourism. Graduate students in this track may specialize in areas such as recreational land management, resource-based tourism, planning for recreation and tourism, and the human dimensions of natural resource uses. Additionally, students may focus on environmental education and leadership for effective communication with diverse publics about natural resources.

Recreation Resources, Tourism, and Environmental Education - Suggested Course List (18 - 28 Credits)

Plan A students must enroll in 18 coursework credits in addition to orientation, seminar, and thesis credits, and Plan B students must enroll in 28 credits in addition to orientation and seminar. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

AGRO 5121 - Applied Experimental Design (4.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
EEB 5601 - Limnology (3.0 cr)
ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5223 - Principles and Methods of Evaluation (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
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<td>ESPM 5031</td>
<td>Applied Global Positioning Systems for Geographic Information Systems</td>
<td>3.0 cr</td>
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<tr>
<td>ESPM 5061</td>
<td>Water Quality and Natural Resources</td>
<td>3.0 cr</td>
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<tr>
<td>ESPM 5071</td>
<td>Ecological Restoration</td>
<td>4.0 cr</td>
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<td>ESPM 5108</td>
<td>Ecology of Managed Systems</td>
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<tr>
<td>ESPM 5111</td>
<td>Hydrology and Water Quality Field Methods</td>
<td>3.0 cr</td>
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<tr>
<td>ESPM 5202</td>
<td>Environmental Conflict Management, Leadership, and Planning</td>
<td>3.0 cr</td>
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<tr>
<td>ESPM 5211</td>
<td>Survey, Measurement, and Modeling for Environmental Analysis</td>
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<tr>
<td>ESPM 5241</td>
<td>Natural Resource and Environmental Policy</td>
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<td>ESPM 5242</td>
<td>Methods for Environmental and Natural Resource Policy Analysis</td>
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<tr>
<td>ESPM 5245</td>
<td>Sustainable Land Use Planning and Policy</td>
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<td>ESPM 5602</td>
<td>Regulations and Corporate Environmental Management</td>
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<td>Environmental Management Systems and Strategy</td>
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<td>Environmental Interpretation</td>
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<td>FNRM 5101</td>
<td>Park and Protected Area Tourism</td>
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<td>Forest Ecology</td>
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<td>Measuring and Modeling Forests</td>
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<td>FNRM 5232</td>
<td>Managing Recreational Lands</td>
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<td>FNRM 5259</td>
<td>Visitor Behavior Analysis</td>
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<td>Forest Management Planning</td>
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<td>Topics in Natural Resources</td>
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<td>Urban Forest Management: Managing Greenspaces for People</td>
<td>3.0 cr</td>
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<td>Research Problems: Physiological Ecology</td>
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<td>Research Problems: Forest-Tree Genetics</td>
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<td>Research Problems: Forest Hydrology</td>
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<td>Research Problems: Forest Ecology</td>
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<td>Research Problems: Silviculture</td>
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<td>1.0 - 5.0 cr</td>
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<td>Research Problems: Forest Economics</td>
<td>1.0 - 5.0 cr</td>
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<td>Research Problems: Forest Biometry and Measurements</td>
<td>1.0 - 5.0 cr</td>
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<td>Research Problems: Forest Policy</td>
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<td>Research Problems: Spatial Data Analysis</td>
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<td>FNRM 8207</td>
<td>Economic Analysis of Natural Resource Projects</td>
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<td>LAW 6062</td>
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<td>OLPD 5051</td>
<td>Ethnographic Research Methods</td>
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<td>Principles and Methods of Evaluation</td>
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<tr>
<td>OLPD 5502</td>
<td>Comparative evaluation theory for practice</td>
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<td>OLPD 5611</td>
<td>Facilitation and Meeting Skills</td>
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PA 4101 - Nonprofit Management and Governance (3.0 cr)
PA 5002 - Introduction to Policy Analysis (1.5 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5031 - Statistics for Public Affairs (4.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5503 - Economics of Development (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
PA 5920 - Skills Workshop (0.5 - 4.0 cr)
POL 8126 - Qualitative Methods (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7407 - Analysis of Categorical Data (3.0 cr)
SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)

Tribal Natural Resources
Coursework and research focuses on all aspects of natural resources (i.e., hydrology/water, soils, grasslands, forests, agriculture, etc.) as they pertain to Indigenous peoples, tribal natural resources management, and traditional ecological knowledge. Students will have the option to pursue lines of inquiry spanning the biological, physical, ecological, social, managerial, and engineering sciences.

Students will be prepared for careers as researchers and managers of tribal lands and working with tribes and organizations that are aligned closely with tribal natural resource management.

Tribal Natural Resources - Required Course (3 credits)
FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)

Tribal Natural Resources - Elective Courses (15-25 Credits)
Plan A students will choose 15 credits from the following, in consultation with the advisor. Plan B students will choose 25 credits from the following, in consultation with the advisor. Students may also choose to develop an individualized plan of study from courses not listed below, pending committee and program approval.
AMIN 4501 - Law, Sovereignty, and Treaty Rights (3.0 cr)
AMIN 4511 - Indigenous Political Economies (3.0 cr)
AMIN 459SW - Federal Indian Policy [WI] (3.0 cr)
AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
AMIN 8301 - Critical Indigenous Theory (3.0 cr)
ESPM 5014 - Tribal and Indigenous Natural Resource Management (3.0 cr)
ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
FNRM 5104 - Forest Ecology (4.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
FNRM 8109 - Research Problems: Indigenous Natural Resource Management (1.0 - 5.0 cr)
PUBH 6242 - Cultural Humility with American Indian Populations (2.0 cr)
PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)
PUBH 6246 - General History of American Indians Post Colonization and Review of Historical Trauma (2.0 cr)

Duluth Campus Electives
Students also have the option of enrolling in relevant Duluth campus course offerings with the approval of their advisor, committee, and graduate program. These include MTAG 5110 and 5120; and TRES 5100, 5101, 5102, 5201, 5202, and 5301.
Twin Cities Campus
Natural Resources Science and Management Minor

Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 116d Green Hall, 1530 Cleveland Avenue N., St. Paul MN 55108 (612-624-7683)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Natural Resources Science and Management Program normally emphasize one of the following tracks: 1) Forests: Biology, Ecology, Conservation, and Management; 2) Economics, Policy, Management, and Society; 3) Assessment, Monitoring, and Geospatial Analysis; 4) Recreation Resources, Tourism, and Environmental Education; 5) Forest Hydrology and Watershed Management; 6) Tribal Natural Resources; 7) Forest Products; or 8) Paper Science and Engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students majoring in other programs who wish to declare a minor in Natural Resources Science and Management must file a proposal with the NRSM program office.

The NRSM program does not require specific courses for completion of the minor, but the expectation is that the minor coursework will be from the ESPM and/or FNRM designator. The student should work in consultation with their major advisor(s) and with the NRSM faculty member who will serve on the student’s examination committee as the representative of the program minor.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Minor Requirements
The NRSM program does not require specific courses for completion of this minor. The minor requires at least 8 credits of graduate-level courses to be chosen in consultation with the student's major advisor and the NRSM faculty member who will serve on the student's examination committee as the minor program representative.

The proposed coursework will be reviewed and approved by NRSM's director of graduate studies.

Doctoral
Requirements
The NRSM program does not require specific courses for completion of this minor. The minor requires at least 12 credits of graduate-level courses to be chosen in consultation with the student's major advisor and the NRSM faculty member who will serve on the student's examination committee as the minor program representative.

The proposed coursework will be reviewed and approved by NRSM's director of graduate studies.
Twin Cities Campus
Natural Resources Science and Management Ph.D.
Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 116d Green Hall, 1530 Cleveland Avenue N, St. Paul MN 55108 (612-624-7683; fax: 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 59
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the natural resources science and management (NRSM) PhD program may emphasize one of the following tracks, or develop an individualized plan of study: 1) forests: biology, ecology, conservation, and management; 2) economics, policy, management, and society; 3) assessment, monitoring, and geospatial analysis; 4) recreation resources, tourism, and environmental education; 5) forest hydrology and watershed management; 6) tribal natural resources; 7) forest products; or 8) paper science and engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Most admitted students have earned degrees in natural resource-related majors. Applicants with exceptional academic records but no related background are eligible; if admitted, they may complete the prerequisites for advanced courses during the early stages of their graduate program. These prerequisites will vary depending upon the student's chosen track and major advisor.

Applicants will not be admitted unless a member of the program faculty agrees to advise the student ahead of time. This decision depends on admissibility (the applicant's overall credentials), mutual research interests, and the faculty member's ability to take on a new student. Some faculty members will not advise students unless they have funding for the student. Applicants are encouraged to review faculty profiles on the program website and begin making contacts prior to and during the application process.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
35 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The NRSM graduate program will typically expect to see 35 course credits. If a student enters the program with a relevant master's degree, relevant credits from the prior degree can be transferred in to apply toward the doctoral degree pending advisor, committee, graduate program, and college approval. Normally, a student who enters the doctoral program with a master's degree will complete fewer than 35 credits in the major program. There are no minor courses required, but students have the option of formally declaring a minor.

Students must also take orientation, where they receive training in the ethical conduct of research and a graduate seminar course, where they present a formal seminar to faculty and peers. This presentation is separate from the final exam seminar.

Required Orientation (1 credit)
NR 8101 - Natural Resources Science and Management Orientation (1.0 cr)

Required Seminar (1 credit)
NR 8107 - Seminar: Natural Resources Science and Management (1.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
NR 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework:
Law, Science & Technology
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Assessment, Monitoring, and Geospatial Analysis
Addresses measurements and related technology applications and resource analysis. Graduate students in this track may choose to specialize in topics such as: geographic information systems (GIS); remote sensing; geospatial analysis; survey design (including forest inventory and monitoring), measurement, modeling; and biometrics. Studies typically focus on landscape, region, or global levels.

Assessment, Monitoring, and Geospatial Analysis - Suggested Course List
Students must enroll in at least 33 credits in addition to orientation, seminar, and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.
Take 0 or more course(s) from the following:
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- ECON 8201 - Econometric Analysis (2.0 cr)
- ECON 8203 - Econometric Analysis (2.0 cr)
- ECON 8204 - Econometric Analysis (2.0 cr)
- EEB 5068 - Plant Physiological Ecology (3.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• ENT 5051 - Scientific Illustration of Insects (3.0 cr)
• ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
• ENT 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
• ESPM 5014 - Tribal and Indigenous Natural Resource Management (3.0 cr)
• ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
• ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
• ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5108 - Ecology of Managed Systems (4.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
• ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
• ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
• ESPM 5555 - Wetland Soils (3.0 cr)
• ESPM 5575 - Wetlands (3.0 cr)
• ESPM 5602 - Regulations and Corporate Environmental Management (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
• ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
• ESPM 5607 - Industrial Biotechnology and the Environment (3.0 cr)
• ESPM 5811 - Environmental Interpretation (3.0 cr)
• FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
• FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
• FNRM 5228 - Advanced Topics in Assessment and Modeling of Forests (3.0 cr)
• FNRM 5232 - Managing Recreational Lands (4.0 cr)
• FNRM 5259 - Visitor Behavior Analysis (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
• FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
• FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 5471 - Forest Management Planning (3.0 cr)
• FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tre Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8108 - Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)
Economics, Policy, Management, and Society

For students interested in focusing on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Graduate students in this track can specialize in areas such as: economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning. Studies might consider choices, impacts, and tradeoffs in protecting, restoring, developing, and allocating natural and environmental resources. The research
conducted by students in this track may address a wide range of issues and problems from local to international in scope.

**Economics, Policy, Management, and Society - Suggested Course List**

Students must enroll in at least 33 credits in addition to their orientation, seminar, and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee. Take 0 or more course(s) from the following:

- **AGRO 5121** - Applied Experimental Design (4.0 cr)
- **APEC 5031** - Methods of Economic Data Analysis (3.0 cr)
- **APEC 5032** - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- **APEC 5321** - Regional Economic Analysis (3.0 cr)
- **APEC 5721** - Economics of Science and Technology Policy (3.0 cr)
- **APEC 8004** - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- **APEC 8202** - Mathematical Optimization in Applied Economics (3.0 cr)
- **APEC 8203** - Applied Welfare Economics and Public Policy (3.0 cr)
- **APEC 8211** - Econometric Analysis I (2.0 cr)
- **APEC 8212** - Econometric Analysis II (2.0 cr)
- **APEC 8601** - Natural Resource Economics (3.0 cr)
- **APEC 8602** - Economics of the Environment (3.0 cr)
- **BIOL 5570** - Design for Sustainable Development - India (3.0 - 9.0 cr)
- **Cl 8149** - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- **COMM 5441** - Communication in Human Organizations (3.0 cr)
- **COMM 8452** - Seminar: Methods of Intercultural/Diversity Facilitation (3.0 cr)
- **CSCI 5302** - Analysis of Numerical Algorithms (3.0 cr)
- **CSCI 5707** - Principles of Database Systems (3.0 cr)
- **DES 8103** - Qualitative and Mixed Methods Research (3.0 cr)
- **ECON 8105** - Macroeconomic Theory (2.0 cr)
- **ECON 8201 - 8204** - Econometric Analysis (2.0 cr)
- **ECON 8205 - 8206** - Macroeconomic Theory (2.0 cr)
- **EEB 5068** - Plant Physiological Ecology (3.0 cr)
- **EEB 5601** - Limnology (3.0 cr)
- **EEB 5609** - Ecosystem Ecology (3.0 cr)
- **EEB 8200** - Sustainability Science Distributed Graduate Seminar (3.0 cr)
- **ENT 5920** - Special Lectures in Entomology (1.0 - 4.0 cr)
- **EPSY 5221** - Principles of Educational and Psychological Measurement (3.0 cr)
- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **EPSY 5244** - Survey Design, Sampling, and Implementation (3.0 cr)
- **EPSY 5247** - Qualitative Methods in Educational Psychology (3.0 cr)
- **EPSY 5261** - Introductory Statistical Methods (3.0 cr)
- **EPSY 5262** - Intermediate Statistical Methods (3.0 cr)
- **EPSY 8251** - Statistical Methods in Education I (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)
- **EPSY 8266** - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- **ESPM 5014** - Tribal and Indigenous Natural Resource Management (3.0 cr)
- **ESPM 5015** - Invasive Plants and Animals: Ecology and Management (3.0 cr)
- **ESPM 5031** - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- **ESPM 5061** - Water Quality and Natural Resources (3.0 cr)
- **ESPM 5071** - Ecological Restoration (4.0 cr)
- **ESPM 5108** - Ecology of Managed Systems (4.0 cr)
- **ESPM 5111** - Hydrology and Water Quality Field Methods (3.0 cr)
- **ESPM 5202** - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- **ESPM 5211** - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- **ESPM 5241** - Natural Resource and Environmental Policy (3.0 cr)
- **ESPM 5242** - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- **ESPM 5245** - Sustainable Land Use Planning and Policy (3.0 cr)
- **ESPM 5251** - Natural Resources in Sustainable International Development (3.0 cr)
- **ESPM 5256** - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
- **ESPM 5261** - Economics and Natural Resources Management (4.0 cr)
- **ESPM 5295** - GIS in Environmental Science and Management (4.0 cr)
- **ESPM 5555** - Wetland Soils (3.0 cr)
- **ESPM 5575** - Wetlands (3.0 cr)
- **ESPM 5602** - Regulations and Corporate Environmental Management (3.0 cr)
- **ESPM 5603** - Environmental Life Cycle Analysis (3.0 cr)
- **ESPM 5604** - Environmental Management Systems and Strategy (3.0 cr)
• ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
• ESPM 5607 - Industrial Biotechnology and the Environment (3.0 cr)
• ESPM 5811 - Environmental Interpretation (3.0 cr)
• FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
• FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
• FNRM 5228 - Advanced Topics in Assessment and Modeling of Forests (3.0 cr)
• FNRM 5232 - Managing Recreational Lands (4.0 cr)
• FNRM 5239 - Visitor Behavior Analysis (3.0 cr)
• FNRM 5255 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5302 - Drones: Data, Analysis, and Operations (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
• FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
• FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 5471 - Forest Management Planning (3.0 cr)
• FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8108 - Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (1.0 - 5.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 4001 - Biometry (4.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
• FW 8200 - Seminar (1.0 - 4.0 cr)
• FW 8494 - Research in Wildlife (1.0 - 4.0 cr)
• GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
• GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
• GEOG 5551 - Principles of Geographic Information Science (4.0 cr)
• GEOG 5552 - GIS Development Practicum (3.0 cr)
• GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
• GEOG 8260 - Seminar: Physical Geography (2.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GIS 5571 - ArcGIS I (3.0 cr)
• GIS 5572 - ArcGIS II (3.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
• LA 5004 - Regional Environmental Landscape Planning (4.0 cr)
• LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
• LA 5576 - Ecological Restoration Project Planning and Management (3.0 cr)
• LAW 6062 - Energy Law (3.0 cr)
• MGMT 6033 - Strategy Implementation (2.0 cr)
• MGMT 6055 - Management of Innovation and Change (2.0 cr)
• NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
• NR 8100 - Topics in Natural Resources Science and Management (1.0 - 2.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>OLDP 5501</td>
<td>Principles and Methods of Evaluation</td>
<td>3.0 cr</td>
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<tr>
<td>OLDP 5611</td>
<td>Facilitation and Meeting Skills</td>
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<td>PA 5002</td>
<td>Introduction to Policy Analysis</td>
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<td>PA 5011</td>
<td>Management of Organizations</td>
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<tr>
<td>PA 5021</td>
<td>Microeconomics for Policy Analysis</td>
<td>3.0 cr</td>
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<tr>
<td>PA 5022</td>
<td>Applications of Economics for Policy Analysis</td>
<td>1.5 - 3.0 cr</td>
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<tr>
<td>PA 5031</td>
<td>Statistics for Public Affairs</td>
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<td>PA 5041</td>
<td>Qualitative Methods for Policy Analysts</td>
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<tr>
<td>PA 5101</td>
<td>Management and Governance of Nonprofit Organizations</td>
<td>3.0 cr</td>
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<tr>
<td>PA 5122</td>
<td>Law and Public Affairs</td>
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<tr>
<td>PA 5242</td>
<td>Environmental Planning, Policy, and Decision Making</td>
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<td>PA 5251</td>
<td>Strategic Planning and Management</td>
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<td>PA 5253</td>
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<tr>
<td>PA 5271</td>
<td>Geographic Information Systems: Applications in Planning and Policy Analysis</td>
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<td>PA 5311</td>
<td>Program Evaluation</td>
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<tr>
<td>PA 5501</td>
<td>Theories and Policies of Development</td>
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<tr>
<td>PA 5503</td>
<td>Economics of Development</td>
<td>3.0 cr</td>
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<tr>
<td>PA 5711</td>
<td>Science, Technology &amp; Environmental Policy</td>
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<td>PA 5721</td>
<td>Energy Systems and Policy</td>
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<td>PA 5722</td>
<td>Economics of Environmental Policy</td>
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<tr>
<td>PA 5741</td>
<td>Risk, Resilience and Decision Making</td>
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<td>PA 5790</td>
<td>Topics in Science, Technology, and Environmental Policy</td>
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<td>PA 5890</td>
<td>Topics in Foreign Policy and International Affairs</td>
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<td>PA 5920</td>
<td>Skills Workshop</td>
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<td>Advanced Topics in Science, Technology, and Environmental Policy</td>
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<td>PLPA 5003</td>
<td>Diseases of Forest and Shade Trees</td>
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<td>Attitudes and Social Behavior</td>
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<td>Topics in Psychology</td>
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<td>PUBH 7250</td>
<td>Designing and Conducting Focus Group Interviews</td>
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<td>PUBH 7407</td>
<td>Analysis of Categorical Data</td>
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<td>SOC 5811</td>
<td>Social Statistics for Graduate Students</td>
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<td>SOC 8701</td>
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<td>Sociological Research Methods</td>
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<td>SOC 8811</td>
<td>Advanced Social Statistics</td>
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<td>SOIL 5555</td>
<td>Wetland Soils</td>
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<td>SOIL 5611</td>
<td>Soil Biology and Fertility</td>
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<td>STAT 5021</td>
<td>Statistical Analysis</td>
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<td>Theory of Statistics I</td>
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<td>Theory of Statistics II</td>
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<td>STAT 5201</td>
<td>Sampling Methodology in Finite Populations</td>
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<td>STAT 5302</td>
<td>Applied Regression Analysis</td>
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<td>STAT 5303</td>
<td>Designing Experiments</td>
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<td>STAT 5401</td>
<td>Applied Multivariate Methods</td>
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<td>Analysis of Categorical Data</td>
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<td>STAT 5511</td>
<td>Time Series Analysis</td>
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<td>STAT 5601</td>
<td>Nonparametric Methods</td>
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<td>STAT 8051</td>
<td>Advanced Regression Techniques: linear, nonlinear and nonparametric methods</td>
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<td>STAT 8052</td>
<td>Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling</td>
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<td>Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression</td>
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<td>STAT 8054</td>
<td>Statistical Methods 4: Advanced Statistical Computing</td>
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<td>WRIT 5051</td>
<td>Graduate Research Writing for International Students</td>
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<td>WRS 5101</td>
<td>Water Policy</td>
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**Forest Hydrology and Watershed Management**

Brings together the integrally related areas of earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Graduate students in this track may specialize in areas such as: forest hydrology, water quality, and watershed management. Research would focus on forest, riparian, and wetland ecosystems.

**Forest Hydrology and Watershed Management - Suggested Course List**

Students must enroll in at least 33 credits in addition to their orientation, seminar, and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee. Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APEC 8211 - Econometric Analysis I (2.0 cr)
• APEC 8212 - Econometric Analysis II (2.0 cr)
• BBE 5513 - Watershed Engineering (3.0 cr)
• BBE 5523 - Ecological Engineering Design (3.0 cr)
• BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
• BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
• BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
• BIOL 8100 - Improvisation for Scientists (1.0 cr)
• CEGE 4501 - Hydrologic Design (4.0 cr)
• CEGE 4512 - Open Channel Hydraulics (4.0 cr)
• CEGE 4522 - Review of Introductory Fluid Mechanics for Graduate Students (3.0 cr)
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• CEGE 8506 - Stochastic Hydrology (4.0 cr)
• CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
• CEGE 8561 - Analysis and Modelling of Aquatic Environments I (3.0 cr)
• CEGE 8562 - Analysis and Modelling of Aquatic Environments II (3.0 cr)
• CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
• EEB 5068 - Plant Physiological Ecology (3.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• EEB 8601 - Introduction to Stream Restoration (3.0 cr)
• EEB 8602 - Stream Restoration Practice (2.0 cr)
• ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
• ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• ESPI 5066 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESPI 4401 - Aquifer Environmental Geochemistry (3.0 cr)
• ESM 4702 - General Hydrogeology (4.0 cr)
• ESM 4703 - Glacial Geology (4.0 cr)
• ESM 5021 - Time-Series Analysis of Geological Phenomena (3.0 cr)
• ESPM 4216 - Contaminant Hydrology (3.0 cr)
• ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
• ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
• ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5108 - Ecology of Managed Systems (4.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
• ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
• ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
• ESPM 5402 - Biometeorology (3.0 cr)
• ESPM 5555 - Wetland Soils (3.0 cr)
• ESPM 5575 - Wetlands (3.0 cr)
• ESPM 5602 - Regulations and Corporate Environmental Management (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
• ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
• ESPM 5811 - Environmental Interpretation (3.0 cr)
• FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
- FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
- FNRM 5232 - Managing Recreational Lands (4.0 cr)
- FNRM 5259 - Visitor Behavior Analysis (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
- FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
- FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
- FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
- FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
- FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
- FNRM 5471 - Forest Management Planning (3.0 cr)
- FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
- FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
- FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
- FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
- FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
- FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
- FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
- FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
- FNRM 8108 - Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)
- FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
- FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
- FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
- FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
- FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
- FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
- FNRM 8207 - Economic Analysis of Natural Resource Projects (1.0 - 5.0 cr)
- FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- GIS 5577 - Spatial Database Design and Administration (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- LAAS 5416 - Precision Agriculture and Nutrient Management (3.0 cr)
- LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
- LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
- LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
- LAW 6062 - Energy Law (3.0 cr)
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- NR 8100 - Topics in Natural Resources Science and Management (1.0 - 2.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5031 - Statistics for Public Affairs (4.0 cr)
- PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
- PA 5501 - Theories and Policies of Development (3.0 cr)
- PA 5503 - Economics of Development (3.0 cr)
- PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
- PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
- PA 5920 - Skills Workshop (0.5 - 4.0 cr)
- PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
- POL 8126 - Qualitative Methods (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
- SOC 8801 - Sociological Research Methods (4.0 cr)
- SOC 8811 - Advanced Social Statistics (4.0 cr)
- SOIL 5232 - Vadose Zone Hydrology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- WRS 5101 - Graduate Research Writing for International Students (3.0 cr)
- WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)

**Forest Products**
For students who wish to specialize in areas such as: wood and fiber as raw materials; deterioration of wood; wood mechanics and structural design; wood moisture interactions and drying; processing and performance of composites; economics of manufacturing systems; technology and processing of solid wood products; marketing, design and production of housing components; and energy-efficient building construction.

**Forest Products - Suggested Course List**
Students must enroll in at least 33 credits in addition to their orientation, seminar, and thesis credit (24 credits of NR 8888 requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.
Take 0 or more course(s) from the following:
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
- BBE 5023 - Process Control and Instrumentation (3.0 cr)
- BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
- BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
- BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
- BBE 5402 - Bio-based Products Engineering Lab II (2.0 cr)
- BBE 5403 - Bio-based Products Engineering Lab I (2.0 cr)
- BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
- BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
- BBE 5713 - Biological Process Engineering (3.0 cr)
- BBE 5733 - Renewable Energy Technologies (3.0 cr)
- BBE 8001 - Seminar I (1.0 cr)
- BBE 8002 - Seminar II (1.0 cr)
- BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CHEM 4214 - Polymers (3.0 cr)
- CHEM 4221 - Introduction to Polymer Chemistry (3.0 cr)
- CHEM 5210 - Materials Characterization (4.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
- ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
- ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
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<td>Environmental Conflict Management, Leadership, and Planning</td>
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<td>Survey, Measurement, and Modeling for Environmental Analysis</td>
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<td>Natural Resource and Environmental Policy</td>
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<td>ESPM 5242</td>
<td>Methods for Environmental and Natural Resource Policy Analysis</td>
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<td>Sustainable Land Use Planning and Policy</td>
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<td>Natural Resources in Sustainable International Development</td>
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<td>Park and Protected Area Tourism</td>
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<td>Forest Ecology</td>
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<td>Hydrology and Watershed Management</td>
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<td>Traditional Ecological Knowledge and Western Natural Resource Management</td>
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<tr>
<td>FNRM 5203</td>
<td>Forest Fire and Disturbance Ecology</td>
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<td>FNRM 5204</td>
<td>Landscape Ecology and Management</td>
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<td>FNRM 5216</td>
<td>Geodesy, Coordinate, and Surveying Calculations for GIS Professionals</td>
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<td>Measuring and Modeling Forests</td>
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<td>Remote Sensing and Geospatial Analysis of Natural Resources and Environment</td>
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<td>Advanced Forest Management Planning</td>
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<td>FNRM 5362</td>
<td>Drones: Data, Analysis, and Operations</td>
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<td>FNRM 5411</td>
<td>Managing Forest Ecosystems: Silviculture</td>
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<td>Managing Forest Ecosystems: Silviculture Lab</td>
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<td>FNRM 5431</td>
<td>Timber Harvesting and Road Planning</td>
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<tr>
<td>FNRM 5462</td>
<td>Advanced Remote Sensing and Geospatial Analysis</td>
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<td>FNRM 5471</td>
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<td>FNRM 5480</td>
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<td>Urban Forest Management: Managing Greenspaces for People</td>
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<td>FNRM 8101</td>
<td>Research Problems: Physiological Ecology</td>
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<td>Research Problems: Forest-Tree Genetics</td>
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<td>Research Problems: Silviculture</td>
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<td>FNRM 8106</td>
<td>Research Problems: Urban Forestry--Biology and Management</td>
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<td>Research Problems: Forest Economics</td>
<td>1.0 - 5.0 cr</td>
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<td>FNRM 8202</td>
<td>Research Problems: Forest Biometry and Measurements</td>
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<td>1.0 - 5.0 cr</td>
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<td>Research Problems: Forest Policy</td>
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<td>Economic Analysis of Natural Resource Projects</td>
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<td>FNRM 8208</td>
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<td>GIS 5555</td>
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<td>LAW 6062</td>
<td>Energy Law</td>
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<td>ME 5228</td>
<td>Introduction to Finite Element Modeling, Analysis, and Design</td>
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<td>PA 5002</td>
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<td>Statistics for Public Affairs</td>
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<td>PA 5041</td>
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<td>PA 5711</td>
<td>Science, Technology &amp; Environmental Policy</td>
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<td>PA 5920</td>
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<td>POL 8126</td>
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<td>PUBH 7250</td>
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<td>Analysis of Categorical Data</td>
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<td>SOC 5811</td>
<td>Social Statistics for Graduate Students</td>
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- SOC 8801 - Sociological Research Methods (4.0 cr)
- SOC 8811 - Advanced Social Statistics (4.0 cr)
- SSM 5614 - Building Systems Performance: Testing & Diagnostics (2.0 cr)
- SSM 5616 - Building Science I: Fundamentals (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)

**Forests: Biology, Ecology, Conservation, and Management**

Focuses on forest resources and allows students to choose from specializations in the following areas: forest biology, ecology, ecophysiology; genetics and tree improvement; tree physiology; reproductive biology and forest regeneration; forest growth and vegetation dynamics; timber harvesting, silviculture, and sustainable forest management; landscape ecology, restoration, and management; conservation of biodiversity and wildlife habitat management; forest health; disturbance (including fire) ecology; urban and community forestry; and agroforestry. Research normally focuses on forest and related ecosystems.

**Forests: Biology, Ecology, Conservation, and Management - Suggested Course List**

Students must enroll in at least 33 credits in addition to their orientation, seminar, and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee. Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
- BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 4609W - Ecosystem Ecology [ENV, W] (3.0 cr)
- EEB 5068 - Plant Physiological Ecology (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
- ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
- ENT 5051 - Scientific Illustration of Insects (3.0 cr)
- ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 5281 - Statistical Methods in Education I (3.0 cr)
- EPSY 5282 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
- ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
- ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
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<tr>
<td>ESPM 5242</td>
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<tr>
<td>ESPM 5245</td>
<td>Sustainable Land Use Planning and Policy (3.0 cr)</td>
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<td>ESPM 5251</td>
<td>Natural Resources in Sustainable International Development (3.0 cr)</td>
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<td>ESPM 5256</td>
<td>Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)</td>
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<tr>
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<td>GIS in Environmental Science and Management (4.0 cr)</td>
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<td>ESPM 5555</td>
<td>Wetland Soils (3.0 cr)</td>
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<td>ESPM 5575</td>
<td>Wetlands (3.0 cr)</td>
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<td>ESPM 5602</td>
<td>Regulations and Corporate Environmental Management (3.0 cr)</td>
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<td>ESPM 5603</td>
<td>Environmental Life Cycle Analysis (3.0 cr)</td>
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<td>ESPM 5604</td>
<td>Environmental Management Systems and Strategy (3.0 cr)</td>
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<td>ESPM 5605</td>
<td>Recycling: Extending Raw Materials Supplies (3.0 cr)</td>
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<td>ESPM 5811</td>
<td>Environmental Interpretation (3.0 cr)</td>
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<td>FNRM 5101</td>
<td>Park and Protected Area Tourism (3.0 cr)</td>
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<tr>
<td>FNRM 5104</td>
<td>Forest Ecology (4.0 cr)</td>
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<td>FNRM 5114</td>
<td>Hydrology and Watershed Management (3.0 cr)</td>
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<tr>
<td>FNRM 5131</td>
<td>Geographical Information Systems (GIS) for Natural Resources (4.0 cr)</td>
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<tr>
<td>FNRM 5140</td>
<td>Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)</td>
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• NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
• NR 8100 - Topics in Natural Resources Science and Management (1.0 - 2.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5031 - Statistics for Public Affairs (4.0 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
• PA 5501 - Theories and Policies of Development (3.0 cr)
• PA 5503 - Economics of Development (3.0 cr)
• PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
• PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
• PA 5920 - Skills Workshop (0.5 - 4.0 cr)
• PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
• PLPA 5480 - Principles of Plant Pathology (3.0 cr)
• POL 8126 - Qualitative Methods (3.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• PUBH 7407 - Analysis of Categorical Data (3.0 cr)
• SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• SOIL 5611 - Soil Biology and Fertility (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Applied Multivariate Methods (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)

Paper Science and Engineering
Specializes in areas such as: the chemistry and biotechnology of lignocellulosic materials; material science of paper and fiber products; paper recycling; energy and manufacturing efficiency in the pulp and paper-making process; novel and environmentally friendly pulping and bleaching, transport processes through porous media, surface and colloid science of papermaking; chemical engineering applications in pulp and paper processes; and statistical process control.

Paper Science and Engineering - Suggested Course List
Students must enroll in at least 33 credits in addition to their orientation, seminar, and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.
Take 0 or more course(s) from the following:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APEC 5211 - Econometric Analysis I (2.0 cr)
• APEC 5212 - Econometric Analysis II (2.0 cr)
• BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
• BBE 5023 - Process Control and Instrumentation (3.0 cr)
• BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
• BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
• BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
• BBE 5305 - Pulp and Paper Technology (3.0 cr)
• BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
• BBE 5402 - Bio-based Products Engineering Lab II (2.0 cr)
• BBE 5403 - Bio-based Products Engineering Lab I (2.0 cr)
• BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
• BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
• BBE 5713 - Biological Process Engineering (3.0 cr)
• BBE 5733 - Renewable Energy Technologies (3.0 cr)
• BBE 8001 - Seminar I (1.0 cr)
• BBE 8002 - Seminar II (1.0 cr)
• BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
• BBE 8300 - Research Problems (1.0 - 10.0 cr)
• BIOL 8100 - Improvisation for Scientists (1.0 cr)
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<td>DES 8103</td>
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<td>ENT 5920</td>
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<td>Initiating New Product Design and Business Development (4.0 cr)</td>
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<td>Principles of Educational and Psychological Measurement (3.0 cr)</td>
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<td>FNRM 5131</td>
<td>Geographical Information Systems (GIS) for Natural Resources (4.0 cr)</td>
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<tr>
<td>FNRM 5140</td>
<td>Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)</td>
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<tr>
<td>FNRM 5203</td>
<td>Forest Fire and Disturbance Ecology (3.0 cr)</td>
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<tr>
<td>FNRM 5204</td>
<td>Landscape Ecology and Management (3.0 cr)</td>
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<td>FNRM 5216</td>
<td>Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)</td>
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<td>FNRM 5218</td>
<td>Measuring and Modeling Forests (3.0 cr)</td>
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<td>FNRM 5262</td>
<td>Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)</td>
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<tr>
<td>FNRM 5264</td>
<td>Advanced Forest Management Planning (3.0 cr)</td>
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<td>FNRM 5362</td>
<td>Drones: Data, Analysis, and Operations (3.0 cr)</td>
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<td>FNRM 5411</td>
<td>Managing Forest Ecosystems: Silviculture (3.0 cr)</td>
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<td>FNRM 5413</td>
<td>Managing Forest Ecosystems: Silviculture Lab (1.0 cr)</td>
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<tr>
<td>FNRM 5431</td>
<td>Timber Harvesting and Road Planning (2.0 cr)</td>
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<tr>
<td>FNRM 5462</td>
<td>Advanced Remote Sensing and Geospatial Analysis (3.0 cr)</td>
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<td>FNRM 5471</td>
<td>Forest Management Planning (3.0 cr)</td>
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<tr>
<td>FNRM 5480</td>
<td>Topics in Natural Resources (1.0 - 3.0 cr)</td>
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<tr>
<td>FNRM 5501</td>
<td>Urban Forest Management: Managing Greenspaces for People (3.0 cr)</td>
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<tr>
<td>FNRM 8101</td>
<td>Research Problems: Physiological Ecology (1.0 - 5.0 cr)</td>
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<tr>
<td>FNRM 8102</td>
<td>Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)</td>
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<td>FNRM 8103</td>
<td>Research Problems: Forest Hydrology (1.0 - 5.0 cr)</td>
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<td>Research Problems: Forest Ecology (1.0 - 5.0 cr)</td>
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<td>FNRM 8105</td>
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<td>FNRM 8106</td>
<td>Research Problems: Urban Forestry–Biology and Management (1.0 - 5.0 cr)</td>
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<td>FNRM 8108</td>
<td>Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)</td>
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<td>Research Problems: Forest Economics (1.0 - 5.0 cr)</td>
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<td>Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)</td>
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<td>FNRM 8203</td>
<td>Research Problems: Forest Recreation (1.0 - 5.0 cr)</td>
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<td>FNRM 8204</td>
<td>Research Problems: Forest Policy (1.0 - 5.0 cr)</td>
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<td>FNRM 8205</td>
<td>Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)</td>
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<td>FNRM 8206</td>
<td>Research Problems: Forest Management (1.0 - 5.0 cr)</td>
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<tr>
<td>FNRM 8207</td>
<td>Economic Analysis of Natural Resource Projects (1.0 - 5.0 cr)</td>
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<tr>
<td>FNRM 8208</td>
<td>Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)</td>
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<tr>
<td>GIS 5555</td>
<td>Basic Spatial Analysis (3.0 cr)</td>
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<tr>
<td>GRAD 8101</td>
<td>Teaching in Higher Education (3.0 cr)</td>
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</table>
Recreation Resources, Tourism, and Environmental Education

Focuses on the use and management of natural resources for recreation and tourism. Graduate students in this track may specialize in areas such as recreational land management, resource-based tourism, planning for recreation and tourism, and the human dimensions of natural resource uses. Additionally, students may focus on environmental education and leadership for effective communication with diverse publics about natural resources.

Recreation Resources, Tourism, and Environmental Education - Suggested Course List

Students must enroll in at least 33 credits in addition to their orientation, seminar, and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- ENT 5920 - Special Lectures in Entomology (1.0 - 4.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
- ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
• ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
• ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
• ESPM 5555 - Wetland Soils (3.0 cr)
• ESPM 5575 - Wetlands (3.0 cr)
• ESPM 5591 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5592 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5595 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5602 - Regulations and Corporate Environmental Management (3.0 cr)
• ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
• ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
• ESPM 5611 - Environmental Interpretation (3.0 cr)
• FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
• FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
• FNRM 5232 - Managing Recreational Lands (4.0 cr)
• FNRM 5259 - Visitor Behavior Analysis (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
• FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 5471 - Forest Management Planning (3.0 cr)
• FNRM 5480 - Topics in Natural Resources (1.0 - 3.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8108 - Research Problems: Forest Ecosystem Health (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (1.0 - 5.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
• LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
• LA 5576 - Ecological Restoration Project Planning and Management (3.0 cr)
• LAW 6062 - Energy Law (3.0 cr)
• NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
• NR 8100 - Topics in Natural Resources Science and Management (1.0 - 2.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
• OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)
• OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
• PA 4101 - Nonprofit Management and Governance (3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5011 - Management of Organizations (3.0 cr)
• PA 5031 - Statistics for Public Affairs (4.0 cr)

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Information current as of November 07, 2022
**Tribal Natural Resources**

Coursework and research focuses on all aspects of natural resources (i.e., hydrology/water, soils, forests, agriculture, etc.) as they pertain to Indigenous peoples, tribal natural resources management, and traditional ecological knowledge. Students will have the option to pursue lines of inquiry spanning the biological, physical, ecological, social, managerial, and engineering sciences. Students will be prepared for careers as researchers and managers of tribal lands and working with tribes and organizations that are aligned closely with tribal natural resources management.

**Tribal Natural Resources - Required Course (3 credits)**

FNRM 5140 - Traditional Ecological Knowledge and Western Natural Resource Management (3.0 cr)

**Tribal Natural Resources - Elective Courses (30 credits)**

Students must enroll in at least 30 elective credits in addition to their orientation, seminar, required, and thesis credits (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

- AMIN 4501 - Law, Sovereignty, and Treaty Rights (3.0 cr)
- AMIN 4511 - Indigenous Political Economies (3.0 cr)
- AMIN 4525W - Federal Indian Policy [WI] (3.0 cr)
- AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
- AMIN 8301 - Critical Indigenous Theory (3.0 cr)
- ESPM 5014 - Tribal and Indigenous Natural Resource Management (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
- FNRM 8109 - Research Problems: Indigenous Natural Resource Management (1.0 - 5.0 cr)
- PUBH 6242 - Cultural Humility with American Indian Populations (2.0 cr)
- PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)
- PUBH 6246 - General History of American Indians Post Colonization and Review of Historical Trauma (2.0 cr)

**Duluth Campus Electives**

Students also have the option of enrolling in relevant Duluth campus course offerings with the approval of their advisor, committee, and graduate program. These include MTAG 5110 and 5120; and TRES 5100, 5101, 5102, 5201, 5202, and 5301.
Nutrition M.S.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Contact Information:
Department of Food Science and Nutrition
1334 Eckles Avenue
Saint Paul, MN 55108
612-624-6753
Email: fsgrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/nutrition

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary.

Advisors and financial support may come from any University of Minnesota departments or schools that house faculty with full Nutrition Graduate Program membership.

Three sub-specialty areas are offered in the program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work can be conducted locally or internationally in the laboratory, clinic, or field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent.

Other requirements to be completed before admission:
The following courses or their equivalents must be completed with a final grade of C- or higher prior to submitting an application:

- General Chemistry
- Organic Chemistry
- General Biology
- Biochemistry
- Physiology
- Statistics

Prerequisite courses taken in high schooleven through programs such as PSEOwill not be accepted under any circumstances.

Applicants demonstrating substantial background in the sciences may be permitted to complete prerequisites after admission.

The following nutrition courses or their equivalents will ideally be completed prior to program entry. These classes may be taken after admission to the program, but must be completed within the first year of a student's graduate career:

- Principles of Nutrition (FSCN 1112)
- Life Cycle Nutrition (FSCN 3612)
Human Nutrition (FSCN 4612)

**Special Application Requirements:**
Applicants advancing to the second round of application review (admissible applicants) will be expected to secure a faculty advisor prior to admission.

Only applicants who have secured an advising agreement shall be recommended to the University of Minnesota Graduate School for formal admission to the Nutrition MS Program.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to **test abbreviations** (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work.

The graduate faculty, including the student's advisor and director of graduate studies, specify the nature and extent of the course and project work necessary to satisfy this requirement.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Coursework (14 credits)**

**Orientation Course (1 credit)**
Take the following course:
- **NUTR 8621** - Presentation Skills (1.0 cr)

**Core Courses (11 credits)**
Take the following courses:
- **NUTR 5622** - Vitamin and Mineral Biochemistry (3.0 cr)
- **NUTR 5624** - Nutrition and Genetics (2.0 cr)
- **NUTR 5625** - Nutritional Biochemistry (3.0 cr)
- **NUTR 5626** - Nutritional Physiology (3.0 cr)

**Advanced Topics Course (2 credits)**
Take the following course after completing 2 semesters in the program:
- **NUTR 8620** - Advances in Nutrition (2.0 cr)

**Statistics Coursework (3-4 credits)**
Select one of the following courses in consultation with the advisor.
- **PUBH 6414** - Biostatistical Literacy (3.0 cr)
- **PUBH 6450** - Biostats I (4.0 cr)

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Information current as of November 07, 2022
Select coursework from the following in consultation with the advisor to reach the total number of cumulative coursework credits.

**Elective Coursework**

NUTR courses are highly recommended.

- ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
- APEC 5751 - Global Trade and Policy (3.0 cr)
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
- PHSL 5115 - Clinical Physiology I (3.0 cr)
- PHSL 5116 - Clinical Physiology II (3.0 cr)
- PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
- PUBH 6154 - Climate Change and Global Health (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6901 - Foundations of Public Health Nutrition Leadership (2.0 cr)
- PUBH 6904 - Nutrition and Aging (2.0 cr)
- PUBH 6906 - Global Nutrition (2.0 cr)
- PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
- VMED 5440 - Using Risk Analysis Tools: Estimating Food Safety Risks on the Farm to Table Continuum (2.0 cr)
- VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)

**Plan Options**

**Plan A**

**Thesis Credits**

Take at least 10 master's thesis credits.

- NUTR 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B**

**Plan B Coursework (10 credits)**

Select 10 credits from the following in consultation with your advisor.

Other coursework may be applied to this requirement with advisor approval.

- NUTR 5993 - Directed Research (1.0 - 4.0 cr)
- NUTR 5994 - Directed Research (1.0 - 4.0 cr)

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Integrated BS/MS-Nutrition**

This sub-plan is limited to students completing the program under Plan B.

The Department of Food Science and Nutrition offers an integrated Bachelor of Science (BS) and Master of Science (MS) in nutrition.
The integrated BS/MS program, colloquially referred to as “the 4+1 program,” offers students the opportunity to earn both degrees in five years by satisfying some master’s degree requirements while completing their undergraduates degree. Graduate-level classes taken during a 4+1 student’s undergraduate career are taken above and beyond undergraduate career requirements.

Nutrition undergraduate students in the DPD or nutrition studies sub-plans are welcome to apply to the 4+1 program during their junior year of undergraduate study. During their senior year, students take undergraduate and graduate courses concurrently and are advised by an undergraduate and graduate program advisor.

Students in this program will complete the 120 undergraduate credits required for a BS degree in nutrition by the end of the senior year and must be awarded an undergraduate degree at the conclusion of their senior year.

4+1 students will complete 30 graduate credits, a Plan B research project, and a final oral defense as required for the nutrition MS degree. Students who satisfy the Didactic Program in Dietetics (DPD) verification requirements can begin the Emily Program Dietetic Internship in August following the conclusion of their master's career.

Students cannot double-count credits to meet credit requirements for both the undergraduate and graduate degrees.
Twin Cities Campus
Nutrition Minor
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition
225 Food Science and Nutrition Building
1334 Eckles Avenue, Saint Paul, MN 55108
phone: 612-624-6753
fax: 612-625-5272
Email: fsgrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/nutrition

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 13
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor, their director of graduate studies, and the Nutrition director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Coursework (6 credits)
Take the following courses:
NUTR 5625 - Nutritional Biochemistry (3.0 cr)
NUTR 5626 - Nutritional Physiology (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Doctoral

Additional Coursework (7 credits)
Doctoral students take the following 7 credits to complete the 13-credit minimum.

NUTR 5624 - Nutrition and Genetics (2.0 cr)
NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)
NUTR 8620 - Advances in Nutrition (2.0 cr)
Twin Cities Campus
Nutrition Ph.D.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition
1334 Eckles Avenue
Saint Paul, MN 55108
612-624-6753
Email: fsgrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/nutrition

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 50
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary.

Advisors and financial support may come from any University of Minnesota departments or schools that house faculty with full Nutrition Graduate Program membership.

Three sub-specialty areas are offered in the program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work can be conducted locally or internationally in the laboratory, clinic, or field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent, along with demonstrated research ability such as a MS degree or publications.

Other requirements to be completed before admission:
Applicants are expected to have a strong foundation in the biological and physical sciences.

The following courses or their equivalents must be completed with a final grade of C- or higher prior to submitting an application:

- General Chemistry
- Organic Chemistry
- General Biology
- Biochemistry
- Physiology
- Statistics

Prerequisite courses taken in high school even through programs such as PSEO will not be accepted under any circumstances.

Applicants demonstrating substantial background in the sciences may be permitted to complete prerequisites after admission.

The following nutrition courses or their equivalents will ideally be completed prior to program entry. These classes may be taken after admission to the program, but must be completed within the first year of the student’s graduate career:
Principles of Nutrition (FSCN 1112)
Life Cycle Nutrition (FSCN 3612)
Human Nutrition (FSCN 4612)

Special Application Requirements:
Applicants who advance to the second round of application review (admissible applicants) will be expected to secure a faculty advisor prior to admission.

Only applicants who have secured an advising agreement shall be recommended to the University of Minnesota Graduate School for formal admission to the Nutrition PhD program.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
14 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

PhD students are expected to obtain teaching experience through assisting with course instruction. Teaching experience is subject to the policies of the advisor's department or division.

Thesis work may be conducted in the laboratory, clinic, or field, either locally or internationally.

Required Coursework
Orientation Course (1 credit)
Take the following course:
NUTR 8621 - Presentation Skills (1.0 cr)

Core Courses (11 credits)
Take the following courses:
NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)
NUTR 5624 - Nutrition and Genetics (2.0 cr)
NUTR 5625 - Nutritional Biochemistry (3.0 cr)
NUTR 5626 - Nutritional Physiology (3.0 cr)

Advanced Topics Course (2 credits)
Take the following course:
NUTR 8620 - Advances in Nutrition (2.0 cr)

Outside Coursework (12 credits)

Statistics Course (3 credits)
Select at least 3 credits from the following list, in consultation with the advisor. Other statistics coursework can be applied to this requirement with advisor approval.
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)

Research Methods Course (2 credits)
Select at least 2 credits from the following list, in consultation with the advisor. Other research methods coursework can be applied to this requirement with advisor approval.
- ANSC 5091 - Research Proposals: From Ideas to Strategic Plans (3.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)

Elective Coursework (0-7 credits)
Select additional coursework as needed in consultation with the advisor. NUTR courses are highly recommended.
- APEC 5751 - Global Trade and Policy (3.0 cr)
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
- BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
- NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
- NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
- PHSL 5115 - Clinical Physiology I (3.0 cr)
- PHSL 5116 - Clinical Physiology II (3.0 cr)
- PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
- PUBH 6154 - Climate Change and Global Health (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 6901 - Foundations of Public Health Nutrition Leadership (2.0 cr)
- PUBH 6904 - Nutrition and Aging (2.0 cr)
- PUBH 6906 - Global Nutrition (2.0 cr)
- PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
- VMED 5440 - Using Risk Analysis Tools: Estimating Food Safety Risks on the Farm to Table Continuum (2.0 cr)
- VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)

Doctoral Thesis Credits
Take 24 doctoral thesis credits.
- NUTR 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Nutritional Sciences M.P.S.

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Dept. of Food Science and Nutrition
1334 Eckles Ave
St. Paul, MN 55108
(612) 624-1290
Email: fscngrad@umn.edu
Website: https://fscn.cfans.umn.edu/graduate/nutrition

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Nutritional Sciences MPS is a terminal, coursework-only degree that prepares students for a career as a Registered Dietitian.

This one-year program focuses on coursework that combines advanced knowledge of nutritional sciences with awareness of the practical applications of research. Graduates will be positioned to interpret and communicate nutritional science concepts to educationally and culturally diverse audiences including content experts, educators, media, and the public.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants should be in the process of completing the Dietetics (DPD) track of the Nutrition major or hold an RD. Admission is for fall semester only.

Other requirements to be completed before admission:
Applicants are expected to have a strong foundation in the biological and physical sciences.

The following courses or their equivalents must be completed with a final grade of C- or higher prior to submitting an application:

General Chemistry
Organic Chemistry
General Biology
Biochemistry
Physiology
Statistics

Prerequisite courses taken in high school even through programs such as PSEO will not be accepted under any circumstances.

Applicants demonstrating substantial background in the sciences may be permitted to complete prerequisites after admission.

The following nutrition courses or their equivalents should be completed prior to program entry. These classes may be taken after admission to the program, but must be completed within the first year of the student's graduate career:

Principles of Nutrition (FSCN 1112)
Life Cycle Nutrition (FSCN 3612)
Human Nutrition (FSCN 4612)
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 24 major credits and 6 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

**Required Coursework (24 credits)**

Take the following courses:

- FSCN 5601 - Management of Eating Disorders (3.0 cr)
- NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)
- NUTR 5624 - Nutrition and Genetics (2.0 cr)
- NUTR 5625 - Nutritional Biochemistry (3.0 cr)
- NUTR 5626 - Nutritional Physiology (3.0 cr)
- NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
- NUTR 8621 - Presentation Skills (1.0 cr)

**Advances in Nutrition**

Take each of the following 2-credit NUTR 8260 courses for a total of 6 credits:

- NUTR 8620: Advances in Nutrition (2.0 cr)
- NUTR 8620: Obesity from the Molecule to the Bedside (2.0 cr)
- NUTR 8620: Current Issues in the Dietetics Profession (2.0 cr)

**Outside Coursework (6 credits)**

Select at least 6 credits from the following in consultation with the advisor, director of graduate studies, and graduate program coordinator.

- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
Twin Cities Campus

Plant Pathology M.S.
Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 31
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, bio-based products, and ecology. The MS program offers a molecular plant pathology track, in which students can design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

The following areas of concentration are also offered: plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a sound college background in the basic biological and physical sciences and mathematics.

Other requirements to be completed before admission:
Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, students must correct them during the first year of the graduate program. These courses cannot be counted as part of the degree program.

Special Application Requirements:
TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 1 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 25 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The capstone project usually involves a smaller research project than the Plan A thesis, extension/teaching related product, or a comprehensive literature review of plant pathology related subject. The project subject, scope, and the specific format of the expected final product must be agreed upon by the student's committee.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Total credits required is 31.5 credits.

Plan A students must complete 15.5 credits of PLPA coursework.

Plan B students must complete 25.5 credits of PLPA coursework.

Students must enroll in a credit or non-credit teaching methods seminar or workshop, chosen in consultation with the advisor and director of graduate studies.

Regular attendance at weekly plant pathology seminars is expected.

Internships are encouraged as part of the graduate experience. Financial support for international or domestic internships is available on a competitive basis.

Take PLPA 5480 (3 credits), if an introductory plant pathology course has not previously been taken.

Required Coursework (6.5 credits)

Take the following courses. Take PLPA 8005 for 2 credits to fulfill the one-semester teaching experience. Consult with the advisor and director of graduate studies regarding the additional teaching methods seminar/workshop requirement.

- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- PLPA 8200 - Plant Pathology Seminar (1.0 cr)
- PLPA 8005 - Supervised Classroom or Extension Teaching Experience (1.0 - 2.0 cr)

Non-Molecular Required Courses (4 credits)

Complete the following:

- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (3.0 cr)

Plant Pathology Electives (5 to 12 credits)

Plan A students select 5 credits, and Plan B students select 5 to 12 credits from the following. All courses must be chosen in consultation with the advisor, graduate advisory committee, and director of graduate studies.

- PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 cr)
- PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
- PLPA 5303 - Data Visualization in Plant and Microbial Biology (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)

Outside Coursework (6 credits)

Select 6 credits, from the following or other coursework, in consultation with the advisor, director of graduate studies, and advisory committee.

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
- BIOL 5272 - Applied Biostatistics (4.0 cr)
- SOIL 5611 - Soil Biology and Fertility (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
PLPA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Capstone Project (10 credits)
Take project credits, as needed to complete the 31.5-credit requirement for the degree, in consultation with the advisor and graduate advisory committee.
PLPA 8300 - Plant Pathology Project (1.0 - 6.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Molecular Plant Pathology
This sub-plan is limited to students completing the program under Plan A.

Molecular Plant Pathology (21.5 credits)
Required Coursework (10.5 credits)
Take the following courses. Take PLPA 8005 for 2 credits to fulfill the one-semester teaching experience. Consult with the advisor and director of graduate studies regarding the additional teaching methods seminar/workshop requirement.
PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 8005 - Supervised Classroom or Extension Teaching Experience (1.0 - 2.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
PLPA 8200 - Plant Pathology Seminar (1.0 cr)
Select courses from the following, or other electives as needed to complete minimum credit requirements. All courses must be chosen in consultation with the director of graduate studies, advisor, and graduate advisory committee.
PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
PLPA 5202 - Field Plant Pathology (2.0 cr)
PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
PLPA 5303 - Data Visualization in Plant and Microbial Biology (3.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)

Outside Coursework Molecular PLPA (6 credits)
Select at least 6 course credits outside the major in consultation with advisor, director of graduate studies, and advisory committee.
AGRO 5121 - Applied Experimental Design (4.0 cr)
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
BIOL 5272 - Applied Biostatistics (4.0 cr)
SOIL 5611 - Soil Biology and Fertility (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
Twin Cities Campus
Plant Pathology Minor
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with many other fields including food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology, plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Plant Pathology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Coursework (6 to 12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Plant Pathology director of graduate studies:

- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 cr)
- PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (3.0 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)

Program Sub-plans

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Information current as of November 07, 2022
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Plant Pathology Ph.D.
Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 56
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, biobased products, and ecology. The PhD program offers a molecular plant pathology track, in which students can design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

The following areas of concentration are also offered: plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite co-evolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a sound college background in the basic biological and physical sciences and mathematics.

Applicants must satisfy all the prerequisites for the master's degree program in plant pathology, or have a master's degree in either plant pathology or a field of natural science.

Other requirements to be completed before admission:
Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, they must be corrected during the first year of the graduate program. Applicants should note that these courses cannot be counted as part of the degree program. All students accepted into the department with only a BS degree are admitted into the MS degree program. After a minimum of two semesters, students who qualify may elect to change their degree status to the PhD program. Criteria for the change include scholastic standing, potential for success in completing a PhD, and writing competency.

Special Application Requirements:
GRE scores are NOT required for Fall 2021 admissions. TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 1 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79

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Information current as of November 07, 2022
Internet Based - Writing Score: 21
Internet Based - Reading Score: 19
IELTS
- Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
20 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.00 is required for students to remain in good standing.
At least 2 semesters must be completed before filing a Degree Program Form.

Students must enroll in a supervised teaching or extension teaching experience, chosen in consultation with the advisor and director of graduate studies.
Degree plans are determined by the advisory committee, with approval of the director of graduate studies.
Regular attendance at weekly plant pathology seminars is expected.
Internships are encouraged as part of the graduate experience. Financial support for international or domestic internships is available on a competitive basis.

Required Coursework (13 credits)
Take the following courses. Take PLPA 8200 twice for a total of 2 credits. Take PLPA 8005 for 2 credits to fulfill the one-semester teaching experience requirement. Take GRAD 8101 concurrently with or after completing PLPA 8005.

PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
PLPA 8200 - Plant Pathology Seminar (1.0 cr)
PLPA 8005 - Supervised Classroom or Extension Teaching Experience (1.0 - 2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)

Electives (12 credits)
Take at least 12 credits, in consultation with the advisor, to complete the outside credit requirement.
AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
AGRO 5021 - Plant Breeding Principles (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
PLPA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Standard Program
Standard Program Courses (7 credits)
Take the following courses:
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Molecular Plant Pathology
Molecular Plant Pathology Courses (7 credits)
Take the following courses. Take PLPA 5300 twice for a total of 2 credits.
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 cr)

Virology or Bacteriology Course
Take one of the following courses:
PLPA 8104 - Plant Virology (2.0 cr)
or PLPA 8105 - Plant Bacteriology (3.0 cr)
Twin Cities Campus
Risk Analysis for Introduced Species and Genotypes Minor
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, Room 219 Hodson Hall, 6125B, 1980 Folwell Ave., St. Paul, MN 55108
Email: isgigert@umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in risk analysis for introduced species and genotypes is available to master's (M.A. and M.S.) and doctoral students. The minor provides an interdisciplinary curriculum that addresses all phases of risk analysis pertaining to the introduction of exotic species and novel genotypes. The curriculum is based on collaborative learning and includes a survey course, discussions, a problem solving practicum, and a cooperative learning practicum. The minor complements major programs in applied economics; applied plant sciences; conservation biology; ecology, evolution, and behavior; entomology; natural resources science and management; plant biological sciences; and water resources science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
ISG Core Courses
The master's minor requires 6 graduate credits from the core curriculum; ISG 8001 must be taken two times for 1 credit each time.
ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
ISG 5020 [Inactive](1.0 cr)
ISG 8001 [Inactive](1.0 cr)

Doctoral
ISG Doctoral Minor
In addition to the 10-credit core listed, a 3-credit decision analysis or quantitative modeling course from another program is required.
ISG 8001 must be taken twice for one credit.
ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
ISG 5020 [Inactive](1.0 cr)
ISG 8001  *(Inactive)* (1.0 cr)
ISG 8021 - Problem Solving Practicum in Risk Analysis (3.0 cr)
ISG 8031 - Cooperative Learning Practicum (1.0 cr)
Twin Cities Campus

Sustainable Agriculture Systems Minor
Agronomy & Plant Genetics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Sustainable Agriculture Systems Minor, 411 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108 (612-625-3754; fax:612-625-1268)
Email: sheaf001@umn.edu
Website: http://www.misa.umn.edu/StudentPrograms/GraduateMinor/index.htm

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in sustainable agriculture systems offers master's (MA and MS) and doctoral students an interdisciplinary curriculum that considers the biological, sociological, and economic aspects of agriculture. The minor emphasizes a holistic perspective to designing farming and food systems and solving problems in agriculture. The importance of yield and profitability are balanced by considerations of the environment and the health and social well-being of producers, consumers, and communities. A unique component of the minor is an on-site internship with growers, grassroots organizations, or public agencies working in sustainable agriculture. The minor complements major programs in ecology, conservation biology, forestry, sociology, geography, political science, and public affairs, as well as majors in the College of Food, Agricultural and Natural Resource Sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission is contingent upon prior admission to a master's or doctoral degree-granting program.

Special Application Requirements:
Contact the director of graduate studies in sustainable agriculture systems for an Intent to Enroll Form. Students are admitted each semester.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Coursework (6 Credits)
All students pursuing the Sustainable Agriculture Systems minor must complete the following courses for a total of 6 credits. Take SAGR 8020 for 1 credit.
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
- SAGR 8020 - Field Experience in Sustainable Agriculture (1.0 - 4.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Master's-level Minor**

The master's-level Sustainable Agriculture minor comprises the 6 required course credits noted above.

**Doctoral**

**Doctoral-level Minor Electives (6 Credits)**

In addition to the 6 required credits, select at least 6 credits in consultation with the Sustainable Agriculture Systems director of graduate studies to complete the 12-credit minimum.
Twin Cities Campus
American Indian and Indigenous Studies Minor
American Indian Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Indian Studies, 19 Scott Hall, 72 Pleasant Street SE, Minneapolis MN 55455, phone 612-624-1338
Email: obrie002@umn.edu
Website: https://cla.umn.edu/ais

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Grounded by a strong commitment to the worlds, histories, representations, and political struggles of Indigenous peoples locally and globally, the intellectual project of American Indian and Indigenous Studies (AIIS) uses interdisciplinary methods of critical inquiry as a means through which doctoral students engage research and scholarship in their major fields of study. An AIIS minor is composed of graduate course work with core and affiliated Indigenous studies faculty in the Department of American Indian Studies and other departments.

The AIIS graduate minor strengthens students’ work in their major field of study, as they will learn how to best integrate American Indian and Indigenous Studies into their existing work as well as how to complement their research to include indigenous methodologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the AIIS director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor field coursework offered on both the A-F and S/N grading basis must be taken A-F.

The cumulative GPA for minor field coursework is 3.00.

Required Core Course (3 credits)
Select one of the following core courses in consultation with the AIIS director of graduate studies.

AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
AMIN 8301 - Critical Indigenous Theory (3.0 cr)
HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)

Electives (3-9 credits)
Masters students select 3 credits and doctoral students select 9 credits from the following, in consultation with the AIIS director of graduate studies, to complete minimum credit requirements. Courses from the Required Core course list not applied to that requirement can be used as electives. Topics coursework must be preapproved by the AIIS director of graduate studies and must be
taken for 3 credits. If chosen, AMIN 4994 or AMIN 4996 must be taken for 3 credits.

AAS 4231 - Color of Public Policy: African Americans, American Indians, Asian Americans & Chicanos in the U.S. (3.0 cr)

or AMIN 4231 - Color of Public Policy: African Americans, American Indians, Asian Americans, & Chicanos in the U.S. (3.0 cr)

AMIN 4501 - Law, Sovereignty, and Treaty Rights (3.0 cr)

AMIN 4511 - Indigenous Political Economies (3.0 cr)

AMIN 4525W - Federal Indian Policy [WI] (3.0 cr)

AMIN 4532 - Vine Deloria, Jr.: A Renaissance Indigenous Figure (3.0 cr)

AMIN 4990 - Topics in American Indian Studies (1.0 - 4.0 cr)

AMIN 4994 - Directed Research (1.0 - 12.0 cr)

AMIN 4996 - Field Study (1.0 - 12.0 cr)

AMIN 5107 - The Structure of Anishinaabemowin: The Ojibwe Language (3.0 cr)

AMIN 5141 - American Indian Language Planning (3.0 cr)

AMIN 5202 - Indigenous Peoples and Issues Before the United States Supreme Court (3.0 cr)

AMIN 5402 - American Indians and the Cinema [AH, DSJ] (3.0 cr)

AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HiS, DSJ] (3.0 cr)

AMIN 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)

AMIN 5920 - Topics in American Indian Studies (3.0 cr)

AMIN 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)

AMST 8920 - Topics in American Studies (3.0 cr)

ANTH 8510 - Topics in Archaeology (3.0 cr)

CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)

ESCI 4602 - Sedimentology and Stratigraphy (3.0 cr)

HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)

AMIN 5602 - Archaeology and Native Americans [DSJ] (3.0 cr)

or ANTH 5601 - Archaeology and Native Americans [DSJ] (3.0 cr)

HIST 5891 - American Indian and Indigenous Studies Workshop (1.5 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

- **Doctoral**
- **Masters**
Twin Cities Campus
American Studies M.A.
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street SE, Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The American Studies graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the American Studies PhD program.

The American Studies graduate program is an interdisciplinary, interdepartmental program. The graduate faculty consists of core American Studies faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate major in a field related to American Studies or other preparation acceptable to the American Studies admissions committee.

Special Application Requirements:
Note: The American Studies graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the American Studies PhD program.

The application deadline is December 1 of the year prior to intended entry. Refer to the program website for application procedures and additional information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 21 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project requires 3 papers completed in consultation with the advisor.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language

A minimum GPA of 3.50 is required for students to remain in good standing.

All courses are selected in consultation with the student's advisor and the director of graduate studies. "Major" courses are defined as any courses that American Studies deems appropriate to the student's area of study, due to the interdisciplinary nature of the program.

Required Courses (6 credits)
Take the following courses:
- AMST 8201 - Historical Foundations of American Studies (3.0 cr)
- AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)

Core Areas (9 credits)
Research Seminars (6 credits)
Take 6 AMST research seminar credits related to the selected concentration. Other research seminar credits can be substituted for this requirement. All courses must be approved by the advisor and director of graduate studies.

Comparative Culture (3 credits)
Select 3 credits for this requirement. Coursework must be approved by the advisor and director of graduate studies.

Concentration Area Courses (3 to 12 credits)
Plan A students select 3 credits, and Plan B students select 12 credits of concentration area coursework with advisor and director of graduate studies approval.

Cultural Pluralism Course (3 credits)
Select 3 credits for this requirement. Coursework must be approved by the advisor and director of graduate studies.

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
- AMST 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Twin Cities Campus

American Studies Minor

American Studies

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The American Studies graduate program is an interdisciplinary, interdepartmental program. The graduate faculty consists of core American Studies faculty members and graduate faculty members drawn from a wide number of departments. Students develop sub-fields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the American Studies director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minimum cumulative GPA for minor field coursework is 3.50.

Required Course (3 credits)
Select at least 1 of the following courses in consultation with the American Studies director of graduate studies:

- AMST 8201 - Historical Foundations of American Studies (3.0 cr)
- AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)

Electives (6 to 9 credits)
Masters students select 6 credits, and doctoral students select 9 credits from the following in consultation with the American Studies director of graduate studies:

- AMST 8231 - Cultural Fallout: The Cold War and Its Legacy, Readings (3.0 cr)
- AMST 8232 - Cultural Fallout: The Cold War and Its Legacy, Research (3.0 cr)
- AMST 8239 - Gender, Race, Class, Ethnicity, and Sexuality in the United States: Readings (3.0 cr)
- AMST 8240 - Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development (3.0 cr)
- AMST 8249 - Popular Culture and Politics in the 20th Century: Readings (3.0 cr)
- AMST 8250 - Popular Culture and Politics in the 20th Century: Research Strategies (3.0 cr)
AMST 8259 - Literature, History, and Culture: Research Strategies (3.0 cr)
AMST 8260 - Literature, History, and Culture: Topical Development (3.0 cr)
AMST 8288 - Working in the Global Economy: Readings (3.0 cr)
AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
AMST 8920 - Topics in American Studies (3.0 cr)
AMST 8970 - Independent Study in American Studies (1.0 - 9.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
American Studies Ph.D.
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street SE, Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858).
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 57 to 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The American Studies PhD is an interdisciplinary, interdepartmental program. The graduate faculty consists of core American Studies faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate major in a field related to American Studies or other preparation acceptable to the American Studies admissions committee.

Special Application Requirements:
The application deadline is December 1 of the year prior to intended entry. Refer to the program website for application procedures and additional information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
33 to 45 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 3 credits of coursework other than the core must focus on American cultural diversity.

**Core Required Courses (12 credits)**
Take the following courses:
- AMST 8201 - Historical Foundations of American Studies (3.0 cr)
- AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
- AMST 8401 - Practicum in American Studies (3.0 cr)
- AMST 8801 - Dissertation Seminar (3.0 cr)

**Research Seminars (9 credits)**
Nine research seminar credits related to the research area are required. Selected credits, whether from the following list or others, require advisor and director of graduate studies approval.
- AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- AMIN 5920 - Topics in American Indian Studies (3.0 cr)
- AMST 5920 - Topics in American Studies (1.0 - 4.0 cr)
- AMST 8920 - Topics in American Studies (3.0 cr)
- AMST 8970 - Independent Study in American Studies (1.0 - 9.0 cr)
- CHIC 5920 - Topics in Chicana(o) Studies (3.0 cr)
- GLOS 5993 - Directed Studies (1.0 - 4.0 cr)
- GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
- HIST 8980 - Topics in Comparative Women's History (3.0 - 4.0 cr)
- HIST 8021 - History Research Seminar (3.0 cr)
- HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8994 - Directed Research (1.0 - 16.0 cr)

**Comparative Culture (3 credits)**
Select 3 credits from the following in consultation with the advisor. Other courses may be applied with advisor and director of graduate studies approval.
- AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
- AMST 8920 - Topics in American Studies (3.0 cr)
- ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
- CSCL 5910 - Topics in Cultural Studies and Comparative Literature (3.0 - 4.0 cr)
- GWSS 5104 - Transnational Feminist Theory (3.0 cr)
- GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
- HIST 5802 - Readings in American History, 1848-Present (3.0 cr)
- HIST 5891 - American Indian and Indigenous Studies Workshop (1.5 cr)
- HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8980 - Topics in Comparative Women's History (3.0 - 4.0 cr)
- HIST 8802 - Readings in American History, 1848-Present (3.0 cr)
- HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
- HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
- HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
- HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
- POL 8301 - American Politics (3.0 cr)

**Electives**
Select credits as needed, with advisor approval, to complete minimum credit requirements. Up to 12 credits from the above lists can also be applied as electives.

**Thesis Credits**
Take 24 doctoral thesis credits.
- AMST 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Anthropology M.A.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Ave S, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095).
Email: dgsanth@umn.edu
Website: https://cla.umn.edu/anthropology/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 33
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Anthropology graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Anthropology PhD program. Please refer to the Anthropology website at https://cla.umn.edu/anthropology/graduate for more information.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Note: The Anthropology graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Anthropology PhD program. Please refer to the Anthropology website at https://cla.umn.edu/anthropology/graduate for more information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 27 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project will intersect with the milestones of each subfield's preliminary examination process.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B earned for each.

Master's Project (3 credits)
Take the following in consultation with the advisor:
ANTH 8555 - Master's Project Credits (3.0 cr)

Electives (12 to 15 credits)
Students pursuing the Archaeology concentration select at least 12 credits, and students pursuing the Biological Anthropology or the Sociocultural Anthropology concentration select at least 15 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with approval by the advisor and director of graduate studies.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 5008</td>
<td>Advanced Flintknapping (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 5009</td>
<td>Human Behavioral Biology (3.0 cr)</td>
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<tr>
<td>ANTH 5015W</td>
<td>Biology, Evolution, and Cultural Development of Language &amp; Music [SOCS, WI] (3.0 cr)</td>
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<tr>
<td>ANTH 5021W</td>
<td>Anthropology of the Middle East [SOCS, GP, WI] (3.0 cr)</td>
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<tr>
<td>ANTH 5027W</td>
<td>Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)</td>
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<tr>
<td>ANTH 5026</td>
<td>Historical Archaeology (3.0 cr)</td>
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<tr>
<td>ANTH 5045W</td>
<td>Urban Anthropology [WI] (3.0 cr)</td>
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<tr>
<td>ANTH 5112</td>
<td>Reconstructing Hominin Behavior (3.0 cr)</td>
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<tr>
<td>ANTH 5113</td>
<td>Primate Evolution (3.0 cr)</td>
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<tr>
<td>ANTH 5121</td>
<td>Business Anthropology (2.0 cr)</td>
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<tr>
<td>ANTH 5126</td>
<td>Anthropology of Education (3.0 cr)</td>
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<td>ANTH 5221</td>
<td>Anthropology of Material Culture (3.0 cr)</td>
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<td>ANTH 5244</td>
<td>Interpreting Ancient Bone (3.0 cr)</td>
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<td>ANTH 5255</td>
<td>Archaeology of Ritual and Religion (3.0 cr)</td>
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<tr>
<td>ANTH 5269</td>
<td>Analysis of Stone Tool Technology (4.0 cr)</td>
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<tr>
<td>ANTH 5327W</td>
<td>Inca, Aztec &amp; Maya Civilizations [HIS, WI] (3.0 cr)</td>
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<td>ANTH 5401</td>
<td>The Human Fossil Record (3.0 cr)</td>
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<td>ANTH 5402</td>
<td>Zooarchaeology Laboratory (3.0 cr)</td>
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<tr>
<td>ANTH 5403</td>
<td>Quantitative Methods in Biological Anthropology (4.0 cr)</td>
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<tr>
<td>ANTH 5405</td>
<td>Human Skeletal Analysis (4.0 cr)</td>
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<tr>
<td>ANTH 5412</td>
<td>Comparative Indigenous Feminisms [GP] (3.0 cr)</td>
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<td>ANTH 5442</td>
<td>Archaeology of the British Isles (3.0 cr)</td>
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<td>ANTH 5448</td>
<td>Applied Heritage Management (3.0 cr)</td>
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<td>ANTH 5450</td>
<td>Spatial Analysis in Anthropology: Research Design and Field Applications (3.0 cr)</td>
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<td>ANTH 5501</td>
<td>Managing Museum Collections (3.0 cr)</td>
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<tr>
<td>ANTH 5601</td>
<td>Archaeology and Native Americans [DSJ] (3.0 cr)</td>
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<td>ANTH 5901</td>
<td>Topics in Anthropology (3.0 cr)</td>
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<td>ANTH 8001</td>
<td>Ethnography, Theory, History (3.0 cr)</td>
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<tr>
<td>ANTH 8002</td>
<td>Ethnography: Contemporary Theory and Practice (3.0 cr)</td>
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<td>ANTH 8004</td>
<td>Foundations of Anthropological Archaeology (3.0 cr)</td>
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<td>ANTH 8005</td>
<td>Linguistic Anthropology (3.0 cr)</td>
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<td>ANTH 8009</td>
<td>Prehistoric Pathways to World Civilizations (3.0 cr)</td>
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<tr>
<td>ANTH 8111</td>
<td>Evolutionary Morphology (3.0 cr)</td>
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<td>ANTH 8112</td>
<td>Reconstructing Hominin Behavior (3.0 cr)</td>
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<td>ANTH 8113</td>
<td>Primate Evolution (3.0 cr)</td>
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<tr>
<td>ANTH 8114</td>
<td>Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates (3.0 cr)</td>
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<td>ANTH 8129</td>
<td>Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)</td>
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<td>ANTH 8201</td>
<td>Humans and Nonhumans: Hybrids and Collectives (3.0 cr)</td>
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<td>ANTH 8203</td>
<td>Research Methods in Social and Cultural Anthropology (3.0 cr)</td>
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<td>ANTH 8205</td>
<td>Economic Anthropology (3.0 cr)</td>
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<tr>
<td>ANTH 8207</td>
<td>Political and Social Anthropology (3.0 cr)</td>
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<tr>
<td>ANTH 8213</td>
<td>Ecological Anthropology (3.0 cr)</td>
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<tr>
<td>ANTH 8215</td>
<td>Anthropology of Gender (3.0 cr)</td>
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<tr>
<td>ANTH 8219</td>
<td>Grant Writing (2.0 cr)</td>
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<tr>
<td>ANTH 8220</td>
<td>Field School (6.0 cr)</td>
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<tr>
<td>ANTH 8223</td>
<td>Anthropology of Place &amp; Space (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8230</td>
<td>Anthropological Research Design (3.0 cr)</td>
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<tr>
<td>ANTH 8244</td>
<td>Interpreting Ancient Bone (3.0 cr)</td>
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<tr>
<td>ANTH 8510</td>
<td>Topics in Archaeology (3.0 cr)</td>
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<tr>
<td>ANTH 8810</td>
<td>Topics in Sociocultural Anthropology (3.0 cr)</td>
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<tr>
<td>ANTH 8980</td>
<td>Anthropology Graduate Workshop (1.0 cr)</td>
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<tr>
<td>ANTH 8990</td>
<td>Topics in Anthropology (3.0 cr)</td>
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<tr>
<td>ANTH 8991</td>
<td>Independent Study (1.0 - 18.0 cr)</td>
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<tr>
<td>ANTH 8992</td>
<td>Directed Reading (1.0 - 18.0 cr)</td>
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<tr>
<td>ANTH 8993</td>
<td>Directed Study (1.0 - 18.0 cr)</td>
</tr>
<tr>
<td>ANTH 8994</td>
<td>Directed Research (1.0 - 18.0 cr)</td>
</tr>
</tbody>
</table>

**Outside Coursework (6 credits)**

Select 6 credits in consultation with the advisor. Course options are not limited to this list. Other courses can be applied to this requirement with approval by the advisor and director of graduate studies.

- AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- AFRO 5191 - Seminar: The African American Experience in South Africa (3.0 cr)
- AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
- AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
- AFRO 8910 - Topics in Studies of Africa and the African Diaspora (3.0 cr)
- AMES 8920 - Topics in Asian culture (1.0 - 3.0 cr)

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AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
AMIN 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
AMIN 5920 - Topics in American Indian Studies (3.0 cr)
AMIN 8301 - Critical Indigenous Theory (3.0 cr)
AMIN 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
AMST 8920 - Topics in American Studies (3.0 cr)
ANAT 5095 - Advanced Problems in Anatomy (1.0 - 6.0 cr)
ANAT 5150 - Human Gross Anatomy (5.0 cr)
ARCH 5671 - Historic Preservation (3.0 cr)
ARCH 5673 - Historic Property Research and Documentation (3.0 cr)
ARTH 8320 - Seminar: Issues in Early Modern Visual Culture (3.0 cr)
ARTS 5760 - Experimental Film and Video (4.0 cr)
AST 8011 - High Energy Astrophysics (4.0 cr)
BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
BTHX 8120 - Dying in Contemporary Medical Culture (2.0 cr)
BTHX 8510 - Gender and the Politics of Health (3.0 cr)
BTHX 8610 - Medical Consumerism (3.0 cr)
CGSC 8041 - Cognitive Neuroscience (4.0 cr)
CHIC 5374 - Migrant Farmworkers in the United States: Families, Work, and Advocacy [CIV] (4.0 cr)
CHIC 5920 - Topics in Chicana(o) Studies (3.0 cr)
CI 8416 - Speculative Fiction, Radical Imagination, and Social Change (3.0 cr)
CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
CLA 8000 - Topics in Graduate Studies (1.0 - 3.0 cr)
COMM 8110 - Seminar: Communication Research Methods (3.0 cr)
COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
CVM 6908 - Anatomy II (3.0 cr)
ECEF 5371 - Principles of Systematics (3.0 cr)
ECEF 5407 - Ecology (3.0 cr)
ECEF 8201 - Graduate Foundations in Ecology, Evolution and Behavior Semester 1 (4.0 cr)
ECEF 8202 - Graduate Foundations in Ecology, Evolution and Behavior - Semester 2 (4.0 cr)
ECEF 8990 - Graduate Seminar (1.0 - 3.0 cr)
ECEF 8991 - Independent Study: Ecology, Evolution, and Behavior (1.0 - 10.0 cr)
ENGL 8250 - Seminar in Early Modern Studies (3.0 cr)
ENGL 8530 - Readings in American Minority Literature (3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
ENGL 8520 - Seminar: Cultural Theory and Practice (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
ESCI 5302 - Isotope Geology (3.0 cr)
ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
FNMR 5104 - Forest Ecology (4.0 cr)
FNMR 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNMR 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
FREN 8240 - Critical Issues: French and Francophone Cinema (3.0 cr)
GEOG 5511 - Principles of Cartography (4.0 cr)
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
GEOG 8001 - Problems in Geographic Thought (3.0 cr)
GEOG 8230 - Theoretical Geography (3.0 cr)
GEOG 8260 - Seminar: Physical Geography (2.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)
GIS 5571 - ArcGIS I (3.0 cr)
GIS 5576 - Spatial Digital Humanities (3.0 cr)
GIS 5577 - Spatial Database Design and Administration (3.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
GSD 8001 - Approaches to Textual Analysis (3.0 cr)
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)
GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)

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HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
HIST 8032 - Archives (3.0 cr)
HIST 8122 - Public Histories (3.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8950 - Topics in Latin American History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8970 - Advanced Research in Quantitative History (3.0 cr)
HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)
HSPH 8001 - Who Owns the Past? Common Concerns and Big Questions in Heritage and Public History (3.0 cr)
HSPH 8122 - Public Histories (3.0 cr)
HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
HSPH 8004 - Capstone in Heritage Studies and Public History (3.0 cr)
HSPH 8005 - Leadership and Future of Historical Organizations (1.0 cr)
HSPH 8006 - Digital Methods for Heritage Studies & Public History (3.0 cr)
HSPH 8007 - Archives (3.0 cr)
HSPH 8010 - Topics in Heritage Studies and Public History (1.0 - 3.0 cr)
HSPH 8101 - Internship (3.0 cr)
HSPH 8992 - Directed Readings in HSPH (1.0 - 3.0 cr)
LAW 6063 - Law and Neuroscience (2.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)
PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)
PHIL 8602 - Scientific Representation and Explanation (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
SOC 8551 - Life Course Inequality & Health (3.0 cr)
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
TH 8120 - Seminar (3.0 cr)

Concentrations

Archaeology

Required Core Courses (9 credits)
Take the following courses:
ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)
ANTH 8009 - Prehistoric Pathways to World Civilizations (3.0 cr)
ANTH 8230 - Anthropological Research Design (3.0 cr)

Methods Course (3 credits)
Select 3 credits from the following in consultation with the advisor. Additional courses taken from this list can be applied towards the Electives requirement.
ANTH 4101 - Decolonizing Archives (3.0 cr)
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
ANTH 5450 - Spatial Analysis in Anthropology: Research Design and Field Applications (3.0 cr)

-OR-

Biological Anthropology

Required Core Courses (9 credits)
Take the following courses:
ANTH 8111 - Evolutionary Morphology (3.0 cr)
ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)
ANTH 8114 - Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates (3.0 cr)
Sociocultural Anthropology

Required Core Courses (9 credits)

Take the following courses:

ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
Twin Cities Campus
Anthropology Minor
Anthropology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: dgsanth@umn.edu
Website: https://cla.umn.edu/anthropology/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor program in anthropology is individually designed by each student in consultation with a faculty advisor and the Anthropology director of graduate studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the Anthropology minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Anthropology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minor is designed, through consultation among the student, Anthropology director of graduate studies, and other relevant faculty members, to meet the student’s academic and professional goals.

Students pursuing the minor must complete at least one ANTH 8xxx-level course.

Coursework applied to the minor must be taken on the A-F grade basis, with a minimum grade of B earned for each course. The minimum cumulative GPA for minor field coursework is 3.00. Exceptions require approval of the Anthropology director of graduate studies.

Coursework (6 to 12 credits)
Master's students select 6 credits, and doctoral students select 12 credits from the following. Selected coursework must be approved by the Anthropology director of graduate studies.
ANTH 5008 - Advanced Flintknapping (3.0 cr)
ANTH 5009 - Human Behavioral Biology (3.0 cr)
ANTH 5015W - Biology, Evolution, and Cultural Development of Language & Music [SOCS, WI] (3.0 cr)
ANTH 5021W - Anthropology of the Middle East [SOCS, GP, WI] (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
ANTH 5028 - Historical Archaeology (3.0 cr)
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<td>ANTH 5113</td>
<td>Primate Evolution</td>
<td>3.0 cr</td>
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<td>Business Anthropology</td>
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<td>ANTH 5128</td>
<td>Anthropology of Education</td>
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<td>ANTH 5221</td>
<td>Anthropology of Material Culture</td>
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<td>Interpreting Ancient Bone</td>
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<td>ANTH 5255</td>
<td>Archaeology of Ritual and Religion</td>
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<td>ANTH 5269</td>
<td>Analysis of Stone Tool Technology</td>
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<td>ANTH 5327W</td>
<td>Inca, Aztec &amp; Maya Civilizations [HIS, WI]</td>
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<td>The Human Fossil Record</td>
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<td>Zooarchaeology Laboratory</td>
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<td>Quantitative Methods in Biological Anthropology</td>
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<td>ANTH 5405</td>
<td>Human Skeletal Analysis</td>
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<td>Comparative Indigenous Feminisms [GP]</td>
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<td>ANTH 5448</td>
<td>Applied Heritage Management</td>
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<td>Spatial Analysis in Anthropology: Research Design and Field Applications</td>
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<td>Managing Museum Collections</td>
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<td>ANTH 5601</td>
<td>Archaeology and Native Americans [DSJ]</td>
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<td>ANTH 5980</td>
<td>Topics in Anthropology</td>
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<td>ANTH 6001</td>
<td>Ethnography, Theory, History</td>
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<td>ANTH 6002</td>
<td>Ethnography: Contemporary Theory and Practice</td>
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<td>ANTH 6004</td>
<td>Foundations of Anthropological Archaeology</td>
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<td>ANTH 6005</td>
<td>Linguistic Anthropology</td>
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<td>ANTH 6009</td>
<td>Prehistoric Pathways to World Civilizations</td>
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<td>Primate Evolution</td>
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<td>ANTH 8114</td>
<td>Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates</td>
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<td>ANTH 8120</td>
<td>Problems in Culture Change and Applied Anthropology</td>
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<td>Humans and Nonhumans: Hybrids and Collectives</td>
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<td>Research Methods in Social and Cultural Anthropology</td>
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<td>ANTH 8205</td>
<td>Economic Anthropology</td>
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<td>ANTH 8207</td>
<td>Political and Social Anthropology</td>
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<td>ANTH 8213</td>
<td>Ecological Anthropology</td>
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<td>ANTH 8215</td>
<td>Anthropology of Gender</td>
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<td>ANTH 8219</td>
<td>Grant Writing</td>
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<td>ANTH 8220</td>
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<td>Anthropology of Place &amp; Space</td>
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<td>Anthropological Research Design</td>
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<td>Interpreting Ancient Bone</td>
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<td>Topics in Archaeology</td>
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<td>ANTH 8810</td>
<td>Topics in Sociocultural Anthropology</td>
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<td>ANTH 8980</td>
<td>Anthropology Graduate Workshop</td>
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<td>Topics in Anthropology</td>
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<tr>
<td>ANTH 8991</td>
<td>Independent Study</td>
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<td>ANTH 8992</td>
<td>Directed Reading</td>
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<td>Directed Study</td>
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<tr>
<td>ANTH 8994</td>
<td>Directed Research</td>
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</table>

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral**
Twin Cities Campus
Anthropology Ph.D.
Anthropology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Ave S, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: dgsanth@umn.edu
Website: https://cla.umn.edu/anthropology/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Anthropology offers graduate education in sociocultural and linguistic anthropology, archaeology, and biological anthropology. The program admits students only for the PhD, although some students do earn a master’s degree as part of their PhD program.

Major areas of faculty research and graduate student training in sociocultural and linguistic anthropology include art and visual culture, critical theory, queer theory, feminist theory, critical disability studies, environment, ecology, and the Anthropocene, cultures of capitalism, language and modernity, colonialism and imperialism, experimental writing, gender, race, and sexuality, medical anthropology, memory and hauntology, religion, multi-species ethnography, new materialisms, political and anthropological economy, political economy, anthropology of race and racism, philosophical anthropology, science and technology studies, sovereignty and the state, and temporality and futurity. Regional specializations include Europe, the Pacific, the Middle East, North America, the Caribbean, and East Asia.

The program in archaeology applies social and ecological theories to produce new anthropological insights into the roles of material culture and the environment in indigenous, prehistoric, and historical contexts. Our archaeologists apply a range of scientific methods in the field and the laboratory to understand human-environmental interactions in the past, and to advance knowledge of landscape use and site formation processes. Regional specializations include Europe, Asia, Latin America, and North America.

The program in biological anthropology offers training and research opportunities in two main areas: paleoanthropology and molecular anthropology. The paleoanthropology speciality combines biological anthropology, vertebrate paleobiology, and Paleolithic archaeology to interpret the evolution and behavior of hominins and other primates through the application of evolutionary theory to the analysis of skeletal morphology, faunal remains, community analysis, and site taphonomy. The molecular anthropology speciality studies the population history of humans by using ancient DNA and modern genomic methods to investigate processes such as migration, admixture, and adaptation, as well as historic trends in disease and health. Students also benefit from training and expertise in primate behavior and ecology, stable isotope paleoecology, phylogeography, geochronology, and phylogenetic methods through close collaborations and co-advising with faculty in other departments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.30.

A bachelor of arts degree or equivalent is required for admission.

Special Application Requirements:
Visit https://cla.umn.edu/anthropology/graduate/how-apply for special application requirements for the Anthropology Ph.D. program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 600

**IELTS**
- Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Coursework offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B earned for each course.

Language requirements depend upon student's special area of research.

**Outside Coursework (12 credits)**

Select 12 credits in consultation with the advisor. Course options are not limited to this list. Other courses can be applied to this requirement with approval by the advisor and director of graduate studies.

- **AFRO 5101** - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- **AFRO 5191** - Seminar: The African American Experience in South Africa (3.0 cr)
- **AFRO 5866** - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
- **AFRO 8202** - Seminar: Intellectual History of Race (3.0 cr)
- **AFRO 8910** - Topics in Studies of Africa and the African Diaspora (3.0 cr)
- **AMES 8920** - Topics in Asian culture (1.0 - 3.0 cr)
- **AMIN 5409** - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
- **AMIN 5412** - Comparative Indigenous Feminisms [GP] (3.0 cr)
- **AMIN 5890** - Readings in American Indian and Indigenous History (3.0 cr)
- **AMIN 5920** - Topics in American Indian Studies (3.0 cr)
- **AMIN 8301** - Critical Indigenous Theory (3.0 cr)
- **AMIN 8910** - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
- **AMST 8289** - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- **AMST 8920** - Topics in American Studies (3.0 cr)
- **ANAT 5095** - Advanced Problems in Anatomy (1.0 - 6.0 cr)
- **ANAT 5150** - Human Gross Anatomy (5.0 cr)
- **ARCH 5671** - Historic Preservation (3.0 cr)
- **ARCH 5673** - Historic Property Research and Documentation (3.0 cr)
- **ARTH 8320** - Seminar: Issues in Early Modern Visual Culture (3.0 cr)
- **ARTS 5760** - Experimental Film and Video (4.0 cr)
- **AST 8011** - High Energy Astrophysics (4.0 cr)
- **BTHX 5210** - Ethics of Human Subjects Research (3.0 cr)
- **BTHX 8120** - Dying in Contemporary Medical Culture (2.0 cr)
- **BTHX 8510** - Gender and the Politics of Health (3.0 cr)
- **BTHX 8610** - Medical Consumerism (3.0 cr)
- **CGSC 8041** - Cognitive Neuroscience (4.0 cr)
- **CHIC 5374** - Migrant Farmworkers in the United States: Families, Work, and Advocacy [CIV] (4.0 cr)
- **CHIC 5920** - Topics in Chicana(o) Studies (3.0 cr)
- **CI 8416** - Speculative Fiction, Radical Imagination, and Social Change (3.0 cr)
- **CI 8645** - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- **CNRC 5993** - Directed Studies (1.0 - 4.0 cr)
- **COMM 5211** - Critical Media Studies: Theory and Methods (3.0 cr)
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<td>COMM 8210</td>
<td>Seminar: Selected Topics in U.S. Electronic Media</td>
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<td>CSCL 8910</td>
<td>Advanced Topics in Comparative Literature</td>
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<td>CVM 6908</td>
<td>Anatomy II</td>
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<td>EEB 5371</td>
<td>Principles of Systematics</td>
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<td>EMS 8250</td>
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<td>Readings in American Minority Literature</td>
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<td>ESCI 5302</td>
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<td>ESPM 5031</td>
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<td>FNRM 5104</td>
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<td>FNRM 5262</td>
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<td>FNRM 5462</td>
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<td>FREN 8240</td>
<td>Critical Issues: French and Francophone Cinema</td>
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<td>Principles of Geographic Information Science</td>
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<td>Readings in American Indian and Indigenous History</td>
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<td>Topics in U.S. History</td>
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<td>Scope and Methods of Historical Studies</td>
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<td>HIST 8032</td>
<td>Archives</td>
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<td>HIST 8122</td>
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<td>Topics in African History</td>
<td>1.0 - 4.0 cr</td>
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<td>HIST 8950</td>
<td>Topics in Latin American History</td>
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<td>Topics in History</td>
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<td>HIST 8970</td>
<td>Advanced Research in Quantitative History</td>
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<td>Foundations in the History of Modern Medicine, 1800-present</td>
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<td>Research Methods in the History of Science, Technology, and Medicine</td>
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<td>HSCI 8950</td>
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<td>Who Owns the Past? Common Concerns and Big Questions in Heritage and Public History</td>
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<td>Core Practices in Heritage Studies and Public History</td>
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<td>Leadership and Future of Historical Organizations</td>
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<td>HSPH 8992</td>
<td>Directed Readings in HSPH</td>
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<td>LAW 6063</td>
<td>Law and Neuroscience</td>
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<td>MST 5011</td>
<td>Museum History and Philosophy</td>
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OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)  
PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)  
PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)  
PHIL 8602 - Scientific Representation and Explanation (3.0 cr)  
POL 8260 - Topics in Political Theory (3.0 cr)  
PUBH 6045 - Skills for Policy Development (1.0 cr)  
PUBH 6450 - Biostatistics I (4.0 cr)  
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)  
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)  
SOC 8551 - Life Course Inequality & Health (3.0 cr)  
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)  
STAT 5021 - Statistical Analysis (4.0 cr)  
TH 8120 - Seminar (3.0 cr)  
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)  
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)

**Thesis Credits**

Take 24 doctoral thesis credits.

ANTH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Concentration Areas**

**Sociocultural Anthropology (24 credits)**

Students must take at least one 8-level seminar in Anthropology both fall and spring semester the first year of study.

**Required Core Courses (9 credits)**

Take the following courses:

ANTH 8001 - Ethnography, Theory, History (3.0 cr)  
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)  
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)

**Major Elective Courses (15 credits)**

Select at least 15 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with approval by the advisor and director of graduate studies.

ANTH 5008 - Advanced Flintknapping (3.0 cr)  
ANTH 5009 - Human Behavioral Biology (3.0 cr)  
ANTH 5015W - Biology, Evolution, and Cultural Development of Language & Music [SOCS, WI] (3.0 cr)  
ANTH 5021W - Anthropology of the Middle East [SOCS, GP, WJ] (3.0 cr)  
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)  
ANTH 5028 - Historical Archaeology (3.0 cr)  
ANTH 5045W - Urban Anthropology [WI] (3.0 cr)  
ANTH 5112 - Reconstructing Hominin Behavior (3.0 cr)  
ANTH 5113 - Primate Evolution (3.0 cr)  
ANTH 5121 - Business Anthropology (2.0 cr)  
ANTH 5128 - Anthropology of Education (3.0 cr)  
ANTH 5221 - Anthropology of Material Culture (3.0 cr)  
ANTH 5244 - Interpreting Ancient Bone (3.0 cr)  
ANTH 5255 - Archaeology of Ritual and Religion (3.0 cr)  
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)  
ANTH 5327W - Inca, Aztec & Maya Civilizations [HIS, WI] (3.0 cr)  
ANTH 5401 - The Human Fossil Record (3.0 cr)  
ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)  
ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)  
ANTH 5405 - Human Skeletal Analysis (4.0 cr)  
ANTH 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)  
ANTH 5442 - Archaeology of the British Isles (3.0 cr)  
ANTH 5448 - Applied Heritage Management (3.0 cr)  
ANTH 5450 - Spatial Analysis in Anthropology: Research Design and Field Applications (3.0 cr)  
ANTH 5501 - Managing Museum Collections (3.0 cr)  
ANTH 5601 - Archaeology and Native Americans [DSJ] (3.0 cr)  
ANTH 5904 - Topics in Anthropology (3.0 cr)  
ANTH 8005 - Linguistic Anthropology (3.0 cr)  
ANTH 8009 - Prehistoric Pathways to World Civilizations (3.0 cr)  
ANTH 8111- Evolutionary Morphology (3.0 cr)  
ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)  
ANTH 8113 - Primate Evolution (3.0 cr)  
ANTH 8114 - Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates (3.0 cr)
ANTH 8120 - Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)
ANTH 8201 - Humans and Nonhumans: Hybrids and Collectives (3.0 cr)
ANTH 8205 - Economic Anthropology (3.0 cr)
ANTH 8207 - Political and Social Anthropology (3.0 cr)
ANTH 8213 - Ecological Anthropology (3.0 cr)
ANTH 8215 - Anthropology of Gender (3.0 cr)
ANTH 8219 - Grant Writing (2.0 cr)
ANTH 8220 - Field School (6.0 cr)
ANTH 8223 - Anthropology of Place & Space (3.0 cr)
ANTH 8230 - Anthropological Research Design (3.0 cr)
ANTH 8244 - Interpreting Ancient Bone (3.0 cr)
ANTH 8510 - Topics in Archaeology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
ANTH 8980 - Anthropology Graduate Workshop (1.0 cr)
ANTH 8990 - Topics in Anthropology (3.0 cr)
ANTH 8991 - Independent Study (1.0 - 18.0 cr)
ANTH 8992 - Directed Reading (1.0 - 18.0 cr)
ANTH 8993 - Directed Study (1.0 - 18.0 cr)
ANTH 8994 - Directed Research (1.0 - 18.0 cr)

-OR-

Biological Anthropology (24 credits)
Students must take at least one 8-level seminar in Anthropology both fall and spring semester the first year of study.

Required Core Courses (9 credits)
Take the following courses:
ANTH 8111 - Evolutionary Morphology (3.0 cr)
ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)
ANTH 8114 - Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates (3.0 cr)

Major Elective Courses (15 credits)
Select at least 15 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with approval by the advisor and director of graduate studies.
ANTH 5008 - Advanced Flintknapping (3.0 cr)
ANTH 5009 - Human Behavioral Biology (3.0 cr)
ANTH 5015W - Biology, Evolution, and Cultural Development of Language & Music [SOCS, WI] (3.0 cr)
ANTH 5021W - Anthropology of the Middle East [SOCS, GP, WI] (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
ANTH 5028 - Historical Archaeology (3.0 cr)
ANTH 5045W - Urban Anthropology [WI] (3.0 cr)
ANTH 5112 - Reconstructing Hominin Behavior (3.0 cr)
ANTH 5113 - Primate Evolution (3.0 cr)
ANTH 5121 - Business Anthropology (2.0 cr)
ANTH 5128 - Anthropology of Education (3.0 cr)
ANTH 5221 - Anthropology of Material Culture (3.0 cr)
ANTH 5244 - Interpreting Ancient Bone (3.0 cr)
ANTH 5255 - Archaeology of Ritual and Religion (3.0 cr)
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
ANTH 5327W - Inca, Aztec & Maya Civilizations [HIS, WI] (3.0 cr)
ANTH 5401 - The Human Fossil Record (3.0 cr)
ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
ANTH 5405 - Human Skeletal Analysis (4.0 cr)
ANTH 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
ANTH 5442 - Archaeology of the British Isles (3.0 cr)
ANTH 5448 - Applied Heritage Management (3.0 cr)
ANTH 5450 - Spatial Analysis in Anthropology: Research Design and Field Applications (3.0 cr)
ANTH 5501 - Managing Museum Collections (3.0 cr)
ANTH 5601 - Archaeology and Native Americans [DSJ] (3.0 cr)
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)
ANTH 8005 - Linguistic Anthropology (3.0 cr)
ANTH 8009 - Prehistoric Pathways to World Civilizations (3.0 cr)
ANTH 8113 - Primate Evolution (3.0 cr)
ANTH 8120 - Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)
ANTH 8201 - Humans and Nonhumans: Hybrids and Collectives (3.0 cr)
<table>
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<td>Political and Social Anthropology</td>
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<td>ANTH 8213</td>
<td>Ecological Anthropology</td>
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<td>ANTH 8215</td>
<td>Anthropology of Gender</td>
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<tr>
<td>ANTH 8219</td>
<td>Grant Writing</td>
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<tr>
<td>ANTH 8220</td>
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<td>ANTH 8223</td>
<td>Anthropology of Place &amp; Space</td>
<td>3.0</td>
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<td>1.0 - 18.0</td>
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<td>ANTH 8992</td>
<td>Directed Reading</td>
<td>1.0 - 18.0</td>
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<td>Directed Study</td>
<td>1.0 - 18.0</td>
</tr>
<tr>
<td>ANTH 8994</td>
<td>Directed Research</td>
<td>1.0 - 18.0</td>
</tr>
</tbody>
</table>

-OR-

**Archaeology (24 credits)**

Students must take at least one 8-level seminar in Anthropology both fall and spring semester the first year of study.

**Required Core Courses (9 credits)**

Take the following courses:

- ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)
- ANTH 8009 - Prehistoric Pathways to World Civilizations (3.0 cr)
- ANTH 8230 - Anthropological Research Design (3.0 cr)

**Methods Course (3 credits)**

Select at least 3 credits from the following in consultation with the advisor. Additional courses taken from this list can be applied towards the Major Electives requirement.

- ANTH 4101 - Decolonizing Archives (3.0 cr)
- ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
- ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
- ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
- ANTH 5450 - Spatial Analysis in Anthropology: Research Design and Field Applications (3.0 cr)

**Archaeology Major Electives Courses (12 credits)**

Select at least 12 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with approval by the advisor and director of graduate studies.

- ANTH 5008 - Advanced Flintknapping (3.0 cr)
- ANTH 5009 - Human Behavioral Biology (3.0 cr)
- ANTH 5015W - Biology, Evolution, and Cultural Development of Language & Music [SOCS, WI] (3.0 cr)
- ANTH 5021W - Anthropology of the Middle East [SOCS, GP, WI] (3.0 cr)
- ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
- ANTH 5028 - Historical Archaeology (3.0 cr)
- ANTH 5045W - Urban Anthropology [WI] (3.0 cr)
- ANTH 5112 - Reconstructing Hominin Behavior (3.0 cr)
- ANTH 5113 - Primate Evolution (3.0 cr)
- ANTH 5121 - Business Anthropology (2.0 cr)
- ANTH 5128 - Anthropology of Education (3.0 cr)
- ANTH 5221 - Anthropology of Material Culture (3.0 cr)
- ANTH 5244 - Interpreting Ancient Bone (3.0 cr)
- ANTH 5255 - Archaeology of Ritual and Religion (3.0 cr)
- ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
- ANTH 5327W - Inca, Aztec & Maya Civilizations [HIS, WI] (3.0 cr)
- ANTH 5401 - The Human Fossil Record (3.0 cr)
- ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
- ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
- ANTH 5405 - Human Skeletal Analysis (4.0 cr)
- ANTH 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
- ANTH 5442 - Archaeology of the British Isles (3.0 cr)
- ANTH 5448 - Applied Heritage Management (3.0 cr)
- ANTH 5450 - Spatial Analysis in Anthropology: Research Design and Field Applications (3.0 cr)
- ANTH 5501 - Managing Museum Collections (3.0 cr)
- ANTH 5601 - Archaeology and Native Americans [DSJ] (3.0 cr)
- ANTH 5980 - Topics in Anthropology (3.0 cr)
• ANTH 8001 - Ethnography, Theory, History (3.0 cr)
• ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
• ANTH 8005 - Linguistic Anthropology (3.0 cr)
• ANTH 8111 - Evolutionary Morphology (3.0 cr)
• ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)
• ANTH 8113 - Primate Evolution (3.0 cr)
• ANTH 8114 - Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates (3.0 cr)
• ANTH 8120 - Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)
• ANTH 8201 - Humans and Nonhumans: Hybrids and Collectives (3.0 cr)
• ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
• ANTH 8205 - Economic Anthropology (3.0 cr)
• ANTH 8207 - Political and Social Anthropology (3.0 cr)
• ANTH 8213 - Ecological Anthropology (3.0 cr)
• ANTH 8215 - Anthropology of Gender (3.0 cr)
• ANTH 8219 - Grant Writing (2.0 cr)
• ANTH 8220 - Field School (6.0 cr)
• ANTH 8223 - Anthropology of Place & Space (3.0 cr)
• ANTH 8244 - Interpreting Ancient Bone (3.0 cr)
• ANTH 8510 - Topics in Archaeology (3.0 cr)
• ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
• ANTH 8980 - Anthropology Graduate Workshop (1.0 cr)
• ANTH 8990 - Topics in Anthropology (3.0 cr)
• ANTH 8991 - Independent Study (1.0 - 18.0 cr)
• ANTH 8992 - Directed Reading (1.0 - 18.0 cr)
• ANTH 8993 - Directed Study (1.0 - 18.0 cr)
• ANTH 8994 - Directed Research (1.0 - 18.0 cr)
Twin Cities Campus
Art History M.A.
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, University of Minnesota, 338 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: https://cla.umn.edu/art-history

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Art History graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Art History PhD program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: The Art History graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Art History PhD program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 30 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.
Capstone Project: The Plan B capstone project requires two Plan B papers demonstrating the student's mastery of the essential skills of scholarship.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Reading Proficiency

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Reading proficiency in a modern foreign research language is required. Additional modern or ancient languages may be required by the student's advisor, depending on the field.

Required Course (3 credits)
Take the following course:
ARTH 8001 - Art Historiography: Theory and Methods (3.0 cr)
Major Coursework (18 credits)
Select at least 9 credits from one of the following to satisfy the primary area requirement; 6 credits from another to satisfy the secondary area of interest; and 3 credits from a third area to meet the Global Perspectives requirement. All courses must be selected in consultation with the advisor.

Contemporary
ARTH 5411 - Gender and Sexuality in Art Since 1863 (3.0 cr)
ARTH 5413 - Alternative Media: Video, Performance, Digital Art (3.0 cr)
ARTH 5417 - Twentieth Century Theory and Criticism (3.0 cr)
ARTH 5466 - Contemporary Art (3.0 cr)
ARTH 8440 - Seminar: Contemporary Art (3.0 cr)

Early Modern Europe and the Atlantic World
ARTH 5302 - The Image Multiplied: Prints in Early Modern Europe (3.0 cr)
ARTH 5313 - Spanish Baroque Masters: Tradition and Experimentation in Golden Age Spain [HIS] (3.0 cr)
ARTH 5315 - The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800 [AH, TS] (3.0 cr)
ARTH 5335 - Baroque Rome: Art and Politics in the Papal Capital (3.0 cr)
ARTH 5336 - Transformations in 17th Century Art: Caravaggio, Velazquez, and Bernini (3.0 cr)
ARTH 8320 - Seminar: Issues in Early Modern Visual Culture (3.0 cr)
ARTH 8340 - Seminar: Baroque Art (3.0 cr)

East Asia
ARTH 5765 - Early Chinese Art (3.0 cr)
ARTH 5766 - Chinese Painting (3.0 cr)
ARTH 5769 - Connoisseurship and Curatorial Practice in Early Chinese Art (3.0 cr)
ARTH 8720 - Seminar: East Asian Art (3.0 cr)

Film/Photography
ARTH 5655 - African-American Cinema [AH, DSJ] (3.0 cr)
ARTH 8920 - Seminar: Film History and Criticism (3.0 cr)

Islamic
ARTH 5781 - Age of Empire: The Mughals, Safavids, and Ottomans (3.0 cr)
ARTH 8710 - Seminar: Islamic Art (3.0 cr)
ARTH 8783 - Art, Diplomacy, and Empire (3.0 cr)

Modern Europe
ARTH 5422 - Off the Wall: History of Graphic Arts in Europe and America in the Modern Age (3.0 cr)
ARTH 8400 - Seminar: Issues in 19th-Century Art (3.0 cr)

American
ARTH 5565 - American Art in the Gilded Age (3.0 cr)
ARTH 8520 - Seminar: American Art and Material Culture (3.0 cr)

South Asia
ARTH 5774 - The Body in Indian Art (3.0 cr)
ARTH 5777 - The Diversity of Traditions: Indian Empires after 1200 (3.0 cr)
ARTH 5778 - Traditions of South Asian Painting: Past to Present (3.0 cr)
ARTH 8770 - Seminar: Art of India (3.0 cr)

Electives (9 credits)
Select 9 elective credits from the following, at least 3 of which must be ARTH credits, in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval. ARTH 5930 cannot be applied to the Electives requirement.

ARTH 5xxx
ARTH 8xxx

Outside Coursework
Select 6 credits in consultation with the advisor and the director of graduate studies.
Twin Cities Campus
Art History Minor
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, 338 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: https://cla.umn.edu/art-history

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 11
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Our current faculty and institutional strengths support specialization in the art and visual/material culture of the following overlapping fields: American; contemporary; early modern Europe and the Atlantic world; East Asia; film/photography; Islamic; modern Europe; and South Asia.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Art History director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each, to be considered for the minor.

The minimum cumulative GPA for minor field coursework is 3.50.

Coursework (11 to 12 credits)
Masters students select 11 credits, and doctoral students select 12 credits from the following in consultation with the Art History director of graduate studies:
ARTH 5315 - The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800 [AH, TS] (3.0 cr)
ARTH 5335 - Baroque Rome: Art and Politics in the Papal Capital (3.0 cr)
ARTH 5336 - Transformations in 17th Century Art: Caravaggio, Velazquez, and Bernini (3.0 cr)
ARTH 5411 - Gender and Sexuality in Art Since 1863 (3.0 cr)
ARTH 5413 - Alternative Media: Video, Performance, Digital Art (3.0 cr)
ARTH 5417 - Twentieth Century Theory and Criticism (3.0 cr)
ARTH 5466 - Contemporary Art (3.0 cr)
ARTH 5565 - American Art in the Gilded Age (3.0 cr)
ARTH 5655 - African-American Cinema [AH, DSJ] (3.0 cr)
ARTH 5765 - Early Chinese Art (3.0 cr)
ARTH 5766 - Chinese Painting (3.0 cr)
ARTH 5774 - The Body in Indian Art (3.0 cr)
ARTH 5777 - The Diversity of Traditions: Indian Empires after 1200 (3.0 cr)
ARTH 5778 - Traditions of South Asian Painting: Past to Present (3.0 cr)
ARTH 5781 - Age of Empire: The Mughals, Safavids, and Ottomans (3.0 cr)
ARTH 5787 - Visual Cultures in Contact: Cross-Cultural Interaction in the Ancient and Early Medieval Worlds (3.0 cr)
ARTH 5950 - Topics: Art History (3.0 cr)
ARTH 5993 - Directed Study (1.0 - 4.0 cr)
ARTH 5994 - Directed Research (1.0 - 4.0 cr)
ARTH 8190 - Seminar: Issues in Ancient Art and Archaeology (3.0 cr)
ARTH 8200 - Seminar: Medieval Art (3.0 cr)
ARTH 8320 - Seminar: Issues in Early Modern Visual Culture (3.0 cr)
ARTH 8340 - Seminar: Baroque Art (3.0 cr)
ARTH 8400 - Seminar: Issues in 19th-Century Art (3.0 cr)
ARTH 8440 - Seminar: Contemporary Art (3.0 cr)
ARTH 8500 - Issues in Latin American Art (3.0 cr)
ARTH 8520 - Seminar: American Art and Material Culture (3.0 cr)
ARTH 8710 - Seminar: Islamic Art (3.0 cr)
ARTH 8720 - Seminar: East Asian Art (3.0 cr)
ARTH 8770 - Seminar: Art of India (3.0 cr)
ARTH 8783 - Art, Diplomacy, and Empire (3.0 cr)
ARTH 8920 - Seminar: Film History and Criticism (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Art History Ph.D.
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, 338 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: https://cla.umn.edu/art-history

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 78
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

 Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota's doctoral program in art history trains scholars who go on to careers in universities, colleges, museums, and other arts institutions throughout the nation and the world. The faculty's unique range of expertise allow us to offer specialized training that only a few other institutions worldwide are able to match. Our current faculty and institutional strengths support specialization in the art and visual/material culture of the following overlapping fields: American; contemporary; early modern Europe and the Atlantic world; East Asia; film/photography; Islamic; modern Europe; and South Asia.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
In addition to transcripts and test scores, applicants must submit a writing sample, statement of objectives (personal statement) outlining their current and future research interests, and three letters of recommendation. Please refer to the program website and contact the DGS Art History director of graduate studies for further information: https://cla.umn.edu/art-history/graduate/apply.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
42 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See other program requirements below:

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

At least 6 8xxx-level ARTH credits are required, in addition to ARTH 8001. ARTH 8xxx-level seminars must be taken from at least 2 different faculty members.

A maximum of 2 directed study or directed research courses can be applied to degree requirements.

Language requirement: Reading proficiency in two modern foreign research languages. Additional modern or ancient languages may be required by the student's advisor depending on field.

Required Course (3 credits)
Take the following course:
ARTH 8001 - Art Historiography: Theory and Methods (3.0 cr)

Major Coursework (30 credits)
Select at least 18 credits from one of the following to satisfy the primary area requirement; 9 credits from another to satisfy the secondary area of interest; and 3 credits from a third area to meet the Global Perspectives requirement. All courses must be selected in consultation with the advisor.

**Contemporary**
ARTH 5411 - Gender and Sexuality in Art Since 1863 (3.0 cr)  
ARTH 5413 - Alternative Media: Video, Performance, Digital Art (3.0 cr)  
ARTH 5417 - Twentieth Century Theory and Criticism (3.0 cr)  
ARTH 5466 - Contemporary Art (3.0 cr)  
ARTH 8440 - Seminar: Contemporary Art (3.0 cr)

**Early Modern Europe and the Atlantic World**
ARTH 5302 - The Image Multiplied: Prints in Early Modern Europe (3.0 cr)  
ARTH 5313 - Spanish Baroque Masters: Tradition and Experimentation in Golden Age Spain [HIS] (3.0 cr)  
ARTH 5315 - The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800 [AH, TS] (3.0 cr)  
ARTH 5335 - Baroque Rome: Art and Politics in the Papal Capital (3.0 cr)  
ARTH 5336 - Transformations in 17th Century Art: Caravaggio, Velazquez, and Bernini (3.0 cr)  
ARTH 8320 - Seminar: Issues in Early Modern Visual Culture (3.0 cr)  
ARTH 8340 - Seminar: Baroque Art (3.0 cr)

**East Asia**
ARTH 5765 - Early Chinese Art (3.0 cr)  
ARTH 5766 - Chinese Painting (3.0 cr)  
ARTH 5769 - Connoisseurship and Curatorial Practice in Early Chinese Art (3.0 cr)  
ARTH 8720 - Seminar: East Asian Art (3.0 cr)

**Film/Photography**
ARTH 5655 - African-American Cinema [AH, DSJ] (3.0 cr)  
ARTH 8920 - Seminar: Film History and Criticism (3.0 cr)

**Islamic**
ARTH 5781 - Age of Empire: The Mughals, Safavids, and Ottomans (3.0 cr)  
ARTH 8710 - Seminar: Islamic Art (3.0 cr)  
ARTH 8783 - Art, Diplomacy, and Empire (3.0 cr)

**Modern Europe**
ARTH 5422 - Off the Wall: History of Graphic Arts in Europe and America in the Modern Age (3.0 cr)  
ARTH 8400 - Seminar: Issues in 19th-Century Art (3.0 cr)

**American**
ARTH 5565 - American Art in the Gilded Age (3.0 cr)  
ARTH 8520 - Seminar: American Art and Material Culture (3.0 cr)

**South Asia**
ARTH 5774 - The Body in Indian Art (3.0 cr)  
ARTH 5777 - The Diversity of Traditions: Indian Empires after 1200 (3.0 cr)  
ARTH 5778 - Traditions of South Asian Painting: Past to Present (3.0 cr)  
ARTH 8770 - Seminar: Art of India (3.0 cr)

**Electives (9 credits)**
Select 9 elective credits from the following, at least 3 of which must be ARTH credits, in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval. ARTH 5930 cannot be applied to the Electives requirement.
ARTH 5xxx
ARTH 8xxx

Outside Coursework (12 credits)
Select 12 credits in consultation with the advisor and the director of graduate studies, at least 6 credits of which are not art historical in content.

Thesis Credits
Take 24 doctoral thesis credits.
ARTH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Art M.F.A.
Art Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art, E201 Regis Center for Art, 405 21st Avenue S, Minneapolis, MN 55455 (612-625-8096; fax: 612-625-7881).
Email: artdept@umn.edu
Website: http://www.art.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MFA program places major emphasis on creative artistic work of high quality. It promotes not only the conceptual and technical education of the professional artist in their artistic practice, encouraging critical inquiry, excellence, and an understanding of the history of art, but also an experimental approach toward each media. The following four areas of study are available: Drawing, Painting, and Printmaking; Sculpture and Ceramics; Photography and Moving Images; Interdisciplinary Art and Social Practice. The MFA is considered a terminal degree in the field of fine arts and is typically the degree required to teach at the college or university level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission to the MFA program is highly competitive. In addition to meeting the University's application requirements, students applying to the program must demonstrate a high degree of capability and commitment in their artistic portfolio and in their statements of artistic and academic intent. Applicants must submit a portfolio electronically with documentation of artwork completed in the three years prior to admission. Instructions for submitting the portfolio and supplemental materials including three letters of recommendation may be found at the department's website: www.art.umn.edu

Students are admitted for fall semester only.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 58 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The capstone project comprises participation in the University's Katherine E. Nash Gallery MFA thesis exhibition and a supporting paper.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MFA is a 3-year, full-time program, that provides studio space for the three consecutive years for the pursuit of artistic research.

Seminar Courses (9 credits)
Take the following courses. ARTS 8402 must be taken fall of Year 1; Take ARTS 8403 Spring of Year 2; ARTS 8404 must be taken fall of Year 3.
ARTS 8402 - Theoretical Constructions in Contemporary Art (3.0 cr)
ARTS 8403 - MFA Professional Practices and Teaching Pedagogy (3.0 cr)
ARTS 8404 - MFA Thesis Research + Writing (3.0 cr)

MFA Critique Seminars (9 credits)
Take ARTS 8410 fall of Year 1, spring of Year 1, and fall of Year 2.
ARTS 8410 - MFA Critique Seminar (3.0 cr)

Studio Credits (24 credits)
Select credits from the following in consultation with the advisor. ARTS 8420 can be repeated.
ARTS 5110 - Advanced Drawing (4.0 cr)
ARTS 5120 - Advanced Painting (4.0 cr)
ARTS 5140 - Advanced Printmaking (4.0 cr)
ARTS 5230 - Advanced Art + Sound (4.0 cr)
ARTS 5250 - Art + Performance (4.0 cr)
ARTS 5260 - Art + Interdisciplinary Collaborations (3.0 cr)
ARTS 5610 - New Media: Making Art Interactive (4.0 cr)
ARTS 5710 - Advanced Photography and Moving Image Projects (4.0 cr)
ARTS 5750 - Advanced Narrative Digital Filmmaking (4.0 cr)
ARTS 5760 - Experimental Film and Video (4.0 cr)
ARTS 5770 - Animation (4.0 cr)
ARTS 5780 - Advanced Super 8 and 16 MM Filmmaking (4.0 cr)
ARTS 5810 - Advanced Ceramics (4.0 cr)
ARTS 5850 - Advanced Foundry and Metal Sculpture (4.0 cr)
ARTS 5860 - Advanced Sculpture (4.0 cr)
ARTS 5890 - 3D Modeling and Digital Fabrication (4.0 cr)
ARTS 8420 - MFA Studio (1.0 - 6.0 cr)
GCC 5013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)

Outside Coursework (6 credits)
Select at least 6 credits of art theory or art history coursework, in consultation with the advisor, from the following. Other courses may be substituted with prior approval from the director of graduate studies.

ARSH 5xxx

Creative Thesis (16 credits)
Take 8 credits each semester of Year 3 in consultation with the advisor.
ARTS 8450 - MFA Creative Thesis (1.0 - 9.0 cr)
Twin Cities Campus

Art Minor
Art Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art, E201 Regis Center for Art, 405 21st Ave S, Minneapolis, MN 55455 (612-625-8096; fax: 612-625-7881)
Email: artdept@umn.edu
Website: http://www.art.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor program in art places major emphasis on creative artistic work of high quality. It promotes not only the conceptual and technical education of the professional artist in their artistic practice, encouraging critical inquiry, excellence, and an understanding of the history of art, but also an experimental approach toward each media. The following media areas are available: ceramics, drawing and painting, photography, printmaking, sculpture, and experimental and media arts.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students interested in the minor must have undergraduate experience in studio arts.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Art director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minimum cumulative GPA for minor field coursework is 2.80.

Required Course (3 credits)
Take the following course:
ARTS 8402 - Theoretical Constructions in Contemporary Art (3.0 cr)

Electives (6 to 9 credits)
Master's students select 6 credits, and doctoral students select 9 credits to complete minimum requirements. Taking ARTS 8410 to satisfy this requirement requires Art director of graduate studies approval. All courses must be pre-approved by the Art director of graduate studies.
ARTS 5xxx
ARTS 8xxx
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Asian and Middle Eastern Cultures and Media MA
Asian and Middle Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Asian Languages/Literatures
Room 220        FoH
0144A
9 Pleasant St SE
Minneapolis, MN 55455
Email: ames@umn.edu
Website: https://cla.umn.edu/asian-middle-eastern-studies

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Asian & Middle Eastern Cultures & Media program considers applications only from students seeking the PhD degree. It does not admit students directly to the MA. The MA is offered only as an exit degree or interim credential.

The Asian & Middle Eastern Cultures & Media (AMCM) program enables students to pursue the study of Asian and Middle Eastern texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students must designate a language of concentration on their AMCM program application form. Currently, students may select Arabic, Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate studies. For details, see the graduate program website at https://cla.umn.edu/asian-middle-eastern-studies

Special Application Requirements:
Only students admitted to the AMCM PhD program are considered for the MA.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 21 to 24 major credits and 6 to 9 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Advanced knowledge in chosen language

A minimum GPA of 3.5 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

Required Courses (6 credits)

Take the following courses:

AMES 8001 - Critical Approaches to Asian and Middle Eastern Studies (3.0 cr)
AMES 8002 - Research Seminar (3.0 cr)

Core Courses (6 credits)

Select 6 credits from the following:

AMES 5xxx
AMES 8xxx
ARAB 5101 - Advanced Arabic I (4.0 cr)
ARAB 5102 - Advanced Arabic II (4.0 cr)
CHN 5211 - Introductory Classical Chinese I (3.0 cr)
CHN 5212 - Introductory Classical Chinese II (3.0 cr)
JPN 5040 - Readings in Japanese Texts (3.0 cr)
KOR 5040 - Readings in Korean Texts: North Korean Dialect (3.0 cr)
KOR 5140 - Readings in Sino-Korean Texts (3.0 cr)

Electives (9 to 12 credits)

Language Courses (0 to 8 credits)

A maximum of 8 language credits can be applied as electives.

ARAB 5101 - Advanced Arabic I (4.0 cr)
ARAB 5102 - Advanced Arabic II (4.0 cr)
CHN 4041 - Advanced Readings in Modern Chinese I (4.0 cr)
CHN 4042 - Advanced Readings in Modern Chinese II (4.0 cr)
HINDI 4005 - Advanced Hindi I for Graduate Research (4.0 cr)
HINDI 4006 - Advanced Hindi II for Graduate Research (4.0 cr)
JPN 4041 - Advanced Japanese Conversation and Composition I (4.0 cr)
JPN 4042 - Advanced Japanese Conversation and Composition II (4.0 cr)
KOR 4041 - Advanced Readings in Modern Korean I (4.0 cr)
KOR 4042 - Advanced Readings in Modern Korean II (4.0 cr)
URDU 4005 - Advanced Urdu I for Graduate Research (4.0 cr)
URDU 4006 - Advanced Urdu II for Graduate Research (4.0 cr)

Seminars and Courses (1 to 12 credits)

Select credits from the following to complete the Electives requirement. Other courses can be selected with advisor approval.

AMES 5xxx
AMES 8xxx
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
ARTH 5765 - Early Chinese Art (3.0 cr)
ARTH 8710 - Seminar: Islamic Art (3.0 cr)
ARTH 8720 - Seminar: East Asian Art (3.0 cr)
ARTH 8920 - Seminar: Film History and Criticism (3.0 cr)
ARTH 8950 - Seminar: Issues in the History of Art (3.0 cr)
GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
MIMS 8001 - Theories of the Moving Image (3.0 cr)
MIMS 8003 - Historiography of the Moving Image (3.0 cr)

Outside Coursework (6 to 9 credits)
Select credits outside the major in consultation with the advisor and director of graduate studies to complete the 30-credit requirement.
**Twin Cities Campus**  
**Asian and Middle Eastern Cultures and Media Minor**  
*Asian and Middle Eastern Studies*  
*College of Liberal Arts*

Link to a [list of faculty](#) for this program.

**Contact Information:**  
Asian And Middle Eastern Studies  
Room 220 FolH  
0144A  
9 Pleasant St SE  
Email: ames@umn.edu  
Website: [https://cla.umn.edu/asian-middle-eastern-studies](https://cla.umn.edu/asian-middle-eastern-studies)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Asian & Middle Eastern Cultures and Media (AMCM) program enables students to pursue the study of Asian and Middle Eastern texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their AMCM program application form. Currently, students may select Arabic, Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate Studies. For details, see the graduate program website at https://cla.umn.edu/asian-middle-eastern-studies

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
**Special Application Requirements:**  
Students interested in the minor are strongly encouraged to confer first with their major field advisor and director of graduate studies, and the Asian & Middle Eastern Cultures and Media (AMCM) director of graduate studies regarding feasibility and requirements, and to identify an AMCM advisor.

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**  
Use of 4xxx courses towards program requirements is not permitted.

In addition to credit requirements, students must take and pass at the terminal MA level - the language translation examination section of the AMCM MA qualifying examination.

Minor coursework offered on the A-F and S/N basis may be taken S/N with approval of the advisor and AMCM director of graduate studies.

**Required Course (3 credits)**  
Take the following course:  
**AMES 8001 - Critical Approaches to Asian and Middle Eastern Studies (3.0 cr)**

**Electives (9 Credits)**  
Select at least 9 credits from the following in consultation with the ALCM director of graduate studies:  
ALL 5xxx
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Asian and Middle Eastern Cultures and Media PhD
Asian and Middle Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Asian & Middle Eastern Studies .
Room 220        FoIh
0144A
9 Pleasant St SE
Minneapolis, MN 55455
Email: ames@umn.edu
Website: https://cla.umn.edu/asian-middle-eastern-studies

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Asian and Middle Eastern Cultures and Media (AMCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
- A bachelor's degree from an accredited US institution or foreign equivalent
- Strong academic record from a relevant humanities or social science discipline
- A proposed language of concentration (Arabic, Chinese, Japanese, Korean, Hindi/Urdu, or other South Asian language with approval of the director of graduate studies)
- At least three years of college-level study in the proposed language of concentration, or a demonstration of comparable linguistic proficiency as approved by the director of graduate studies

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
33 to 36 credits are required in the major.
12 to 15 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading and speaking competence in chosen language

A minimum GPA of 3.5 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must also pass the translation examination component of the AMCM PhD qualifying examination.

Required Courses (6 credits)
Take the following courses:
AMES 8001 - Critical Approaches to Asian and Middle Eastern Studies (3.0 cr)
AMES 8002 - Research Seminar (3.0 cr)

Core Courses (12 credits)
Select 12 credits from the following:
AMES 5xxx
AMES 8xxx
ARAB 5101 - Advanced Arabic I (4.0 cr)
ARAB 5102 - Advanced Arabic II (4.0 cr)
CHN 5211 - Introductory Classical Chinese I (3.0 cr)
CHN 5212 - Introductory Classical Chinese II (3.0 cr)
JPN 5040 - Readings in Japanese Texts (3.0 cr)
KOR 5040 - Readings in Korean Texts: North Korean Dialect (3.0 cr)
KOR 5140 - Readings in Sino-Korean Texts (3.0 cr)

Electives (15 to 18 credits)
Select 18 credits from the following. Students who wish to take 15 elective credits and additional outside courses to meet the 18-credit minimum must obtain advisor and director of graduate studies approval.

Language Courses (0 to 8 credits)
A maximum of 8 language credits can be applied to the Electives requirement.
ARAB 5101 - Advanced Arabic I (4.0 cr)
ARAB 5102 - Advanced Arabic II (4.0 cr)
CHN 4041 - Advanced Readings in Modern Chinese I (4.0 cr)
CHN 4042 - Advanced Readings in Modern Chinese II (4.0 cr)
HNDI 4005 - Advanced Hindi I for Graduate Research (4.0 cr)
HNDI 4006 - Advanced Hindi II for Graduate Research (4.0 cr)
JPN 4041 - Advanced Japanese Conversation and Composition I (4.0 cr)
JPN 4042 - Advanced Japanese Conversation and Composition II (4.0 cr)
KOR 4041 - Advanced Readings in Modern Korean I (4.0 cr)
KOR 4042 - Advanced Readings in Modern Korean II (4.0 cr)
URDU 4005 - Advanced Urdu I for Graduate Research (4.0 cr)
URDU 4006 - Advanced Urdu II for Graduate Research (4.0 cr)

Seminars and Courses (7 to 15 credits)
Select credits from the following in consultation with the advisor to complete the Electives requirement. Alternative courses can be chosen with advisor approval.
AMES 5xxx
AMES 8xxx
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
ARTH 5765 - Early Chinese Art (3.0 cr)
ARTH 8710 - Seminar: Islamic Art (3.0 cr)
ARTH 8720 - Seminar: East Asian Art (3.0 cr)
ARTH 8920 - Seminar: Film History and Criticism (3.0 cr)
ARTH 8950 - Seminar: Issues in the History of Art (3.0 cr)
GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
MIMS 8001 - Theories of the Moving Image (3.0 cr)
MIMS 8003 - Historiography of the Moving Image (3.0 cr)

Outside Coursework (12 to 15 credits)
Select at least 12 outside credits in consultation with the advisor. Students completing 15 elective credits must take 15 outside credits.

Thesis Credits
Take 24 doctoral thesis credits.
AMES 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Asian and Middle Eastern Studies MA

Contact Information:
Asian And Middle Eastern Studies
Room 220 FolH
0144A
9 Pleasant St SE
Minneapolis, MN 55455-0194
Email: ames@umn.edu
Website: https://cla.umn.edu/asian-middle-eastern-studies

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MA in Asian Studies program is a terminal degree that provides students from a wide range of backgrounds with language proficiency in one Asian or Middle Eastern language, and the relevant knowledge of histories, literatures, and cultures to pursue a wide range of careers, including: government; nonprofit institutions and social work; law, journalism and business; K-12 and community college education; library and archival work; and translation and interpretation. The degree also prepares students interested in pursuing a doctorate in related graduate programs, including the University's Asian and Middle Eastern Cultures and Media PhD.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Intermediate-advanced knowledge of the chosen language

A minimum GPA of 3.3 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Plan A language requirement: Students must fulfill language requirement by completing or demonstrating linguistic proficiency comparable to ARAB 5102, CHN 4008, HNDI 4006, URDU 4006, JPN 4006, or KOR 4006.
Plan B language requirement: Students must fulfill language requirement by completing or demonstrating linguistic proficiency comparable to ARAB 4122, CHN 4004, CHN 4006, HNDI 4004, URDU 4004, JPN 4004, or KOR 4004.

Required Course (3 Credits)
Take the following course:
AMES 8001 - Critical Approaches to Asian and Middle Eastern Studies (3.0 cr)

Language Courses (0 to 9 credits)
Select up to 9 credits as needed in consultation with the advisor. Plan A students who need coursework to meet language requirements must take ARAB 5102, CHN 4008, HNDI 4006, URDU 4006, JPN 4006, or KOR 4006. Plan B students who need coursework to meet language requirements must take ARAB 4122, CHN 4004, CHN 4006, HNDI 4004, URDU 4004, JPN 4004, or KOR 4004.

ARAB 4101 - Beginning Arabic I for Graduate Student Research (5.0 cr)
ARAB 4102 - Beginning Arabic II for Graduate Student Research (5.0 cr)
ARAB 4121 - Intermediate Arabic I for Graduate Student Research (5.0 cr)
ARAB 4122 - Intermediate Arabic II for Graduate Student Research (5.0 cr)
ARAB 5040 - Readings in Arabic Texts (2.0 - 4.0 cr)
ARAB 5101 - Advanced Arabic I (4.0 cr)
ARAB 5102 - Advanced Arabic II (4.0 cr)
CHN 4001 - Beginning Modern Chinese I for Graduate Student Research (5.0 cr)
CHN 4002 - Beginning Modern Chinese II for Graduate Student Research (5.0 cr)
CHN 4003 - Intermediate Modern Chinese I for Graduate Student Research (5.0 cr)
CHN 4004 - Intermediate Modern Chinese II for Graduate Student Research (5.0 cr)
CHN 4005 - Accelerated Beginning Modern Chinese for Graduate Student Research (5.0 cr)
CHN 4006 - Accelerated Intermediate Modern Chinese for Graduate Student Research (5.0 cr)
CHN 4007 - Advanced Modern Chinese I for Graduate Student Research (4.0 cr)
CHN 4008 - Advanced Modern Chinese II for Graduate Student Research (4.0 cr)
CHN 4041 - Advanced Readings in Modern Chinese I (4.0 cr)
CHN 4042 - Advanced Readings in Modern Chinese II (4.0 cr)
HNDI 4001 - Beginning Hindi I for Graduate Student Research (5.0 cr)
HNDI 4002 - Beginning Hindi II for Graduate Student Research (5.0 cr)
HNDI 4003 - Intermediate Hindi I for Graduate Student Research (5.0 cr)
HNDI 4004 - Intermediate Hindi II for Graduate Student Research (5.0 cr)
HNDI 4005 - Advanced Hindi I for Graduate Research (4.0 cr)
HNDI 4006 - Advanced Hindi II for Graduate Research (4.0 cr)
HNDI 4015 - Accelerated Beginning Hindi for Graduate Research (5.0 cr)
JPN 4001 - Beginning Japanese I for Graduate Student Research (5.0 cr)
JPN 4002 - Beginning Japanese II for Graduate Student Research (5.0 cr)
JPN 4003 - Intermediate Japanese I for Graduate Student Research (5.0 cr)
JPN 4004 - Intermediate Japanese II for Graduate Student Research (5.0 cr)
JPN 4005 - Third Year Japanese I for Graduate Student Research (4.0 cr)
JPN 4006 - Third Year Japanese II for Graduate Student Research (4.0 cr)
JPN 4041 - Advanced Japanese Conversation and Composition I (4.0 cr)
JPN 4042 - Advanced Japanese Conversation and Composition II (4.0 cr)
KOR 4001 - Beginning Korean I for Graduate Student Research (5.0 cr)
KOR 4002 - Beginning Korean II for Graduate Student Research (5.0 cr)
KOR 4003 - Intermediate Korean I for Graduate Student Research (5.0 cr)
KOR 4004 - Intermediate Korean II for Graduate Student Research (5.0 cr)
KOR 4005 - Third Year Korean I for Graduate Student Research (4.0 cr)
KOR 4006 - Third Year Korean II for Graduate Student Research (4.0 cr)
KOR 4041 - Advanced Readings in Modern Korean I (4.0 cr)
KOR 4042 - Advanced Readings in Modern Korean II (4.0 cr)
URDU 4001 - Beginning Urdu I for Graduate Student Research (5.0 cr)
URDU 4002 - Beginning Urdu II for Graduate Student Research (5.0 cr)
URDU 4003 - Intermediate Urdu I for Graduate Student Research (5.0 cr)
URDU 4004 - Intermediate Urdu II for Graduate Student Research (5.0 cr)
URDU 4005 - Advanced Urdu I for Graduate Research (4.0 cr)
URDU 4006 - Advanced Urdu II for Graduate Research (4.0 cr)
URDU 4015 - Accelerated Beginning Urdu for Graduate Research (5.0 cr)

Electives (8 to 27 credits)
Select courses from the following list, in consultation with the advisor, to complete the minimum number of course credits required for the Plan A or Plan B degree. Other elective courses may be taken with approval of the advisor.
ALL 5xxx
ALL 8xxx
AMES 5xxx
AMES 8xxx
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
ARTH 8720 - Seminar: East Asian Art (3.0 cr)
ARTH 8950 - Seminar: Issues in the History of Art (3.0 cr)
GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
HIST 5940 (Inactive) (1.0 - 4.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
MIMS 8001 - Theories of the Moving Image (3.0 cr)
MIMS 8003 - Historiography of the Moving Image (3.0 cr)

Thesis Credits
Plan A students must take 10 master's thesis credits.
AMES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Integrated BA Asian Languages and Literatures / MA Asian Studies
The integrated BA/MA is available to eligible University undergraduates pursuing the Asian and Middle Eastern Studies BA degree. Applicants must have a minimum GPA of 3.30 and be within 30 credits of completing the BA to be eligible, with preference given to those with a demonstrated high proficiency in their language of concentration. Applications to the BA/MA are submitted spring semester of the junior year, and admission is contingent on a formal admissions process.

Students admitted to the BA/MA must maintain timely degree progress to ensure completion of the BA no later than the end of their fourth (senior) year. Up to 10 graduate-level credits (5xxx courses) completed in the fourth (senior) year can be applied to the MA degree, with the remaining MA degree requirements completed during the fifth year of study. No credits can be double counted to meet both BA and MA credit requirements.
Twin Cities Campus

Audiology Au.D.

Speech-Language-Hearing Sciences

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-9535; fax: 612-624-7586). Email: slhsgrad@umn.edu Website: http://www.slhs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 102
- This program requires summer semesters for timely completion.
- Degree: Doctor of Audiology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The AuD program, designed to meet audiologist licensure/certification standards, emphasizes diagnostics, rehabilitative techniques and technology, counseling approaches, and human development. Its curriculum and outcome-based learning activities prepare graduates to engage in clinical service delivery and interpret and incorporate research findings into clinical practice.

Individuals interested in pursuing an advanced degree in audiology should apply directly to the audiology AuD program. Students admitted to the AuD are eligible to apply to the University's Speech-Language-Hearing Sciences MA/Audiology track.

The Doctor of Audiology (AuD) education program at the University of Minnesota Twin Cities is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2200 Research Boulevard #310, Rockville, Maryland 20850, 800-498-2071 or 301-296-5700.

Accreditation
This program is accredited by Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
Previous coursework in social/behavioral sciences, biological sciences, and physical sciences (physics or chemistry) is recommended.

Applicants are expected to have completed coursework in statistics (including hypothesis testing), as well as the following prerequisite courses:
SLHS 3302: Anatomy & Physiology of the Speech & Hearing Mechanisms
SLHS 3303: Language Acquisition & Science
SLHS 3304: Phonetics
SLHS 3305W: Speech Science
SLHS 3306: The Sense of Hearing
SLHS 4801: Clinical Methods in Assessing Auditory Functions and Disorders
SLHS 4802: Rehabilitative Audiology

Students admitted without having completed the above prerequisites must complete them upon admission. Prerequisite courses do not count toward the minimum AuD course requirements outlined below, and students admitted without the coursework can expect an additional, 5th year to complete the AuD.

All offers of AuD admission are contingent upon the results of a criminal background check administered by the Minnesota Department...
of Human Services and completion of immunization requirements.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

94 credits are required in the major.

8 credits are required outside the major.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The AuD is a four-year plan of study for students entering with a background in speech-language-hearing sciences. Students without such a background should expect an additional year of study. During the final year, students complete a clinical externship. Summative evaluations include two written comprehensive examinations and a written capstone project that includes an oral presentation and an oral defense of the project.

**Required Courses (42 credits)**

Take the following courses. Courses must be taken A-F.

- **SLHS 5401** - Counseling and Professional Issues (3.0 cr)
- **SLHS 5801** - Advanced Audiologic Assessment (3.0 cr)
- **SLHS 5802** - Hearing Aids I (3.0 cr)
- **SLHS 5803** - Pediatric Audiology (3.0 cr)
- **SLHS 5804** - Cochlear Implants (3.0 cr)
- **SLHS 5805** - Advanced Rehabilitative Audiology (3.0 cr)
- **SLHS 5806** - Auditory Disorders in Children (3.0 cr)
- **SLHS 5807** - Noise and Hearing Conservation (3.0 cr)
- **SLHS 5808** - Pathophysiology of Hearing Disorders (3.0 cr)
- **SLHS 8801** - Electrophysiologic Assessment of Auditory Function (3.0 cr)
- **SLHS 8802** - Hearing Aids II (3.0 cr)
- **SLHS 8803** - Signals and Systems in Audiology (3.0 cr)
- **SLHS 8805** - Hearing Science Foundations of Audiology (3.0 cr)
- **SLHS 8807** - Balance Assessment (3.0 cr)

**Audiology Capstone (6 credits)**

Take 6 credits of the following in consultation with the advisor:

- **SLHS 8806** - Audiology Capstone (1.0 - 6.0 cr)

**Clinical Education in Audiology (17 credits)**

Take 17 credits of the following:

- **SLHS 8820** - Clinical Education in Audiology (1.0 - 8.0 cr)

**Audiology Externship (17 credits)**

Take 17 credits of the following:

- **SLHS 8840** - Audiology Externship (1.0 - 8.0 cr)

**Laboratory Module in Audiology (2 credits)**

Take 2 credits of the following:

- **SLHS 5810** - Laboratory Module in Audiology (1.0 - 2.0 cr)

**Clinical Research and Practice: Grand Rounds (4 credits)**
Take 4 credits of the following:

**SLHS 5820 - Clinical Research and Practice: Grand Rounds (1.0 - 6.0 cr)**

**Clinical Foundations in Audiology (2 credits)**

Take 2 credits of the following:

**SLHS 5830 - Clinical Foundations in Audiology (1.0 - 8.0 cr)**

**Directed Research (4 credits)**

Take 4 credits in consultation with the advisor, fall semester of Year 3, on the S/N grade basis.

**SLHS 8994 - Directed Research (1.0 - 12.0 cr)**

**Outside Coursework (8 credits)**

Select a minimum of 8 credits from the following in consultation with the advisor. Other courses can be selected with advisor approval. At least 2 of the 8 credits must be from non-SLHS courses.

- **ABUS 4022W - Management in Organizations [WI]** (3.0 cr)
- **ABUS 4023W - Communicating for Results [WI]** (3.0 cr)
- **ABUS 4041 - Dynamics of Leadership** (3.0 cr)
- **ABUS 4104 - Management and Human Resource Practices** (3.0 cr)
- **ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship** (3.0 cr)
- **BTHX 5000 - Topics in Bioethics** (1.0 - 4.0 cr)
- **BTHX 5100 - Introduction to Clinical Ethics** (3.0 cr)
- **BTHX 5325 - Biomedical Ethics** (3.0 cr)
- **CGSC 8410 - Perspectives in Learning, Perception, and Cognition** (2.0 cr)
- **CI 5451 - Teaching Reading in Middle and Secondary Grades** (3.0 cr)
- **CI 5642 - Assessing English Learners** (3.0 cr)
- **CI 5653 - Methods in Teaching English as a Second Language (ESL) in Higher Education** (3.0 cr)
- **CPSY 4302 - Infant Development** (3.0 cr)
- **CPSY 4329 - Biological Foundations of Development** (3.0 cr)
- **CPSY 4331 - Perceptual Development** (3.0 cr)
- **CPSY 4343 - Cognitive Development** (3.0 cr)
- **CSPH 5000 - Explorations in Integrative Therapies and Healing Practices** (1.0 - 4.0 cr)
- **CSPH 5101 - Introduction to Integrative Healing Practices** (3.0 cr)
- **CSPH 5111 - Ways of Thinking about Health** (2.0 cr)
- **CSPH 5305 - Introduction to Integrative Mental Health** (2.0 cr)
- **CSPH 5601 - Music, Health and Healing** (2.0 cr)
- **CSPH 5708 - Mind-Body Science and the Art of Transformation** (1.0 cr)
- **CSPH 5806 - Wellbeing and Resiliency for Health Professionals** (1.0 cr)
- **CPSY 5642 - Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing** (3.0 cr)
- **EPSY 5101 - Intelligence and Creativity** (3.0 cr)
- **EPSY 5135 - Human Relations Workshop** (4.0 cr)
- **EPSY 5400 - Special Topics in Counseling Psychology** (1.0 - 4.0 cr)
- **EPSY 5415 - Counseling Children and Adolescents** (3.0 cr)
- **EPSY 5461 - Cross-Cultural Counseling** (3.0 cr)
- **EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention** (3.0 cr)
- **EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI]** (3.0 cr)
- **EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction** (2.0 cr)
- **EPSY 5641 - Foundations of Deaf Education** (3.0 cr)
- **EPSY 5642 - Early Intervention for Infants, Toddlers and Families** (3.0 cr)
- **EPSY 5643 - Seminar: Identity, Culture and Diversity in Deaf Education** (2.0 cr)
- **EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing** (3.0 cr)
- **EPSY 5645 - Deaf Plus: Educating and Understanding Deaf Students with Disabilities** (2.0 cr)
- **EPSY 5654 - Current Research, Issues Trends in Deaf Education** (1.0 cr)
- **EPSY 5657 - Interventions for Behavioral Problems in School Settings** (3.0 cr)
- **EPSY 5661 - Introduction to Autism Spectrum Disorder** (3.0 cr)
- **EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder** (3.0 cr)
- **EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions** (3.0 cr)
- **EPSY 5851 - Engaging Diverse Students and Families** (3.0 cr)
- **EPSY 8600 - Special Topics: Special Education Issues** (1.0 - 3.0 cr)
- **EPSY 8602 - Advanced Topics in Special Education Research** (3.0 cr)
- **FSOS 4107 - Traumatic Stress and Resilience in Vulnerable Families Across the Lifespan** (3.0 cr)
- **FSOS 5937 - Parent-Child Interaction** (3.0 cr)
- **FSOS 5942 - Diverse Family Experiences** (3.0 cr)
- **FSOS 8101 - Family Stress, Coping, and Adaptation** (3.0 cr)
- **GCC 5022 - The Human Experience of Sensory Loss: Seeking Equitable and Effective Solutions [TS]** (3.0 cr)
- **GERO 5125 - Gerontology Service Learning** (1.0 - 3.0 cr)
- **HINF 5501 - US Health Care System: Information Challenges in Clinical Care** (1.0 cr)
- **HSM 4065 - Information Privacy and Security in Health Services Management [TS]** (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HSM 4531</td>
<td>Human Resources in Health Care Settings</td>
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<tr>
<td>KIN 8211</td>
<td>Seminar: Perception and Action</td>
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<tr>
<td>LING 8921</td>
<td>Seminar in Language and Cognition</td>
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<td>NSCI 5101</td>
<td>Neurobiology I: Molecules, Cells, and Systems</td>
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<td>NSCI 5111</td>
<td>Medical Neuroscience for Graduate Students</td>
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<td>OLPD 5211</td>
<td>Introduction to the Undereducated Adult</td>
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<td>OLPD 5356</td>
<td>Disability Policy and Services</td>
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<td>Anatomy of the Head and Neck and Temporal Bone Dissection</td>
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<td>OTOL 8247</td>
<td>Anatomy and Physiology of Hearing and Balance</td>
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<tr>
<td>PA 5451</td>
<td>[Inactive]</td>
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<td>PHAR 5201</td>
<td>Applied Medical Terminology</td>
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<td>PSY 4036</td>
<td>Perceptual Issues in Visual Impairment</td>
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<td>PSY 4960</td>
<td>Seminar in Psychology</td>
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<td>PSY 5014</td>
<td>Psychology of Human Learning and Memory</td>
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<tr>
<td>PSY 5037</td>
<td>Psychology of Hearing</td>
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<td>PSY 5054</td>
<td>Psychology of Language</td>
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<td>PSY 5062</td>
<td>Cognitive Neuropsychology</td>
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<td>PSY 5137</td>
<td>Introduction to Behavioral Genetics</td>
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<td>PSY 5205</td>
<td>Applied Social Psychology</td>
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<td>PSY 5960</td>
<td>Topics in Psychology</td>
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<td>PSY 8037</td>
<td>Psychophysics and Audition</td>
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<td>PUBH 6055</td>
<td>Social Inequalities in Health</td>
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<td>Issues in Environmental Health</td>
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<td>PUBH 6370</td>
<td>Social Epidemiology</td>
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<td>PUBH 6751</td>
<td>Principles of Management in Health Services Organizations</td>
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<td>PUBH 6804</td>
<td>Nutrition and Aging</td>
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<td>PUBH 8805</td>
<td>Sociological Theory in Health Services Research</td>
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<td>SLHS 4402</td>
<td>Clinical Methods in Speech-Language Pathology</td>
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<td>SLHS 5502</td>
<td>Voice and Cleft Palate</td>
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<td>SLHS 5602</td>
<td>Speech Sound Disorders: Assessment and Treatment across Languages</td>
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<td>SLHS 5603</td>
<td>Assessment and Intervention of Language Disorders in Children</td>
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<tr>
<td>SLHS 5605</td>
<td>Language and Cognitive Disorders in Adults</td>
<td>3.0 cr</td>
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<tr>
<td>SLHS 5606</td>
<td>Introduction to Augmentative and Alternative Communication</td>
<td>3.0 cr</td>
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<tr>
<td>SLHS 5609</td>
<td>Child Language Disorders in Diverse Populations</td>
<td>3.0 cr</td>
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<tr>
<td>SLHS 5900</td>
<td>Topics in SLHS</td>
<td>2.0 cr</td>
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<tr>
<td>SLHS 8530</td>
<td>Seminar: Speech</td>
<td>3.0 cr</td>
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<tr>
<td>SOC 4246</td>
<td>Sociology of Health and Illness</td>
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<tr>
<td>SPAN 5985</td>
<td>Sociolinguistic Perspectives on Spanish in the United States</td>
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</tr>
</tbody>
</table>

**Joint- or Dual-degree Coursework:** AuD/PhD in Speech-Language-Hearing Sciences
Student may take a total of 9 credits in common among the academic programs.

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Information current as of November 07, 2022
Twin Cities Campus

Classical and Near Eastern Religions and Cultures Minor

Classical and Near Eastern Religions and Cultures

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Religions & Cultures, 245 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455
(612-625-5353; fax: 612-624-4894)
Email: cnrc@umn.edu
Website: https://cla.umn.edu/cnrc

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and Near Eastern Religions & Cultures (CNRC) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNRC is dedicated to rigorous philological and literary training, and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the CNRC director of graduate studies regarding feasibility and requirements.

Students should have sufficient language proficiency, as determined by the Classical and Near Eastern Religions & Cultures director of graduate studies, to pursue the minor successfully.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Reading proficiency in either Greek or Latin.

Coursework (9 to 12 credits)
Masters students select at least 9 credits, and doctoral students select at least 12 credits of minor field coursework. Course selection is individualized based on the academic and professional goals of the student, and requires approval of the Classical and Near Eastern Religions & Cultures director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Classical and Near Eastern Studies M.A.
Classical and Near Eastern Religions and Cultures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. SE, Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnrc@umn.edu
Website: https://cla.umn.edu/cnrc

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 43
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and Near Eastern Studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The master's-level tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching. Related special facilities include the Center for Medieval Studies, the Center for Jewish Studies, the Center for Modern Greek Studies and the Program in Religious Studies.

Note: Applications for the Greek and Latin tracks are not currently being accepted.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

For the Classics track, students should have sufficient knowledge to begin graduate reading courses in either Greek or Latin and at least intermediate ability in the other language.

Other requirements to be completed before admission:
In addition to the online University application, applicants must complete the Department of Classical and Near Eastern Studies application. Other supporting materials, including recommendations and a writing sample, can be uploaded directly into the University's online application. For non-native speakers of English, a copy of TOEFL results is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester.

Special Application Requirements:
Note: Applications for the Greek and Latin tracks are not currently being accepted.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements

Plan A: Plan A requires 24 to 27 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 to 27 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B capstone comprises two research papers from departmental seminars, graded B+ or higher, that make substantive use of at least one modern scholarly language other than English.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Translation proficiency exams offered 1x semester

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Outside Coursework (6 credits)
Select at least 6 credits in consultation with the advisor.

Plan Options

Plan A Requirements
Take at least 10 master's thesis credits.
CNRC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Classics
The Classics track provides broad training in the literature of ancient Greece and Rome in its cultural context. Work in Greek and Latin is supplemented by courses in a related field or area of interest. This track requires nearly equal emphasis on courses and seminars in Greek and in Latin.

Language Requirements: One modern research language as appropriate (normally French, German, or Italian), and reading proficiency in both Greek and Latin as certified by departmental exam based on a set reading list.

Final examinations: the final examinations are written (Greek and Latin reading proficiency) and oral (general).

Required Coursework (27 credits)

Poetry Courses (12 credits)
Take 6 credits of LAT 5100 and 6 credits of GRK 5100.
LAT 5100 - Advanced Readings in Latin Poetry (3.0 cr)
GRK 5100 - Advanced Reading (3.0 cr)

Prose Courses (12 credits)
Take 6 credits of LAT 5200 and 6 credits of GRK 5200.
LAT 5200 - Advanced Readings in Latin Prose (3.0 cr)
GRK 5200 - Advanced Readings in Greek Prose (3.0 cr)

Seminar course (3 cr)
Students should take one 8xxx course (3 cr) in Latin or Greek
GRK 8xxx
LAT 8xxx
Religions in Antiquity
The Religions in Antiquity track is comparative in both method and content. Although students may focus on a particular religious tradition, they will nonetheless study several ancient religions.

Language Requirements: Proficiency in one modern language (usually German) and master's-level proficiency in classical Hebrew, Greek, or Latin as demonstrated by a departmental examination based on a set reading list.

Final examinations: the final examinations are written (ancient language reading proficiency) and oral (general).

Required Course (3 credits)
Take the following course. An alternative course may be applied to this requirement with director of graduate studies approval.

RELS 5001 - Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion (3.0 cr)

Distribution Requirement (21 credits)
Select at least one course from three of the following four areas for a total of 12 credits, and the remaining 9 credits of the distribution requirement with approval by the director of graduate studies. At least one 8-level course is required. At least 12 of the 21 credits must involve substantial primary readings in an ancient language.

Hebrew Bible or Ancient Near East
CNRC 8513 - Scripture and Interpretation (3.0 cr)

Greek and Roman Religions
CNRC 5071 - Greek and Hellenistic Religions (3.0 cr)
RELS 5071 - Greek and Hellenistic Religions (3.0 cr)

Ancient Judaism
CNRC 5204 - The Dead Sea Scrolls (3.0 cr)
HEBR 5300 - Post-Biblical Hebrew: Second Temple Period (3.0 cr)
RELS 5204 - The Dead Sea Scrolls (3.0 cr)

New Testament and Early Christianity
CNRC 5072 - The Birth of Christianity [AH] (3.0 cr)
GRK 5200 - Advanced Readings in Greek Prose (3.0 cr)
GRK 8400 - Readings in Patristic Greek (3.0 cr)
RELS 5072 - The Birth of Christianity [AH] (3.0 cr)

Greek
Note: Applications for the Greek and Latin tracks are not currently being accepted.

Language Requirements: One modern research language as appropriate, preferably French, German, or Italian, and reading proficiency in Greek as demonstrated by a departmental examination based on a set reading list.

Final examinations: the final examinations are written (Greek reading proficiency) and oral (general).

Required Coursework (24 credits)

Language Courses (15 credits)
Select at least 15 credits from the following in consultation with the advisor. No more than 6 credits of 51xx and/or 52xx credits can be applied to this requirement.

GRK 5xxx
GRK 8xxx

Seminar Courses (6 credits)
Select two seminars, at least one of which must be GRK 8910, in consultation with the advisor.

GRK 8910 - Seminar (3.0 cr)
CNRC 8190 - Seminar: Issues in Ancient Art and Archaeology (3.0 cr)

Prose Composition Course (3 credits)
Take the following course:

GRK 5701 - Prose Composition (3.0 cr)

Latin
Note: Applications for the Greek and Latin tracks are not currently being accepted.

Language Requirements: One modern research language as appropriate, preferably French, German, or Italian, and reading proficiency in Latin as demonstrated by a departmental examination based on a set reading list.

Final examinations: the final examinations are written (Latin reading proficiency) and oral (general).

Required Coursework (24 credits)

Language Courses (15 credits)
Select at least 15 credits from the following in consultation with the advisor. No more than 6 credits of 51xx and/or 52xx credits can
be applied to this requirement.
LAT 5xxx
LAT 8xxx

**Seminar Courses (6 credits)**
Select two seminars, at least one of which must be LAT 8910, in consultation with the advisor.
LAT 8910 - Seminar (3.0 cr)
CNRC 8190 - Seminar: Issues in Ancient Art and Archaeology (3.0 cr)

**Prose Composition Course (3 credits)**
Take the following course:
LAT 5701 - Latin Prose Composition (3.0 cr)
Twin Cities Campus
Classical and Near Eastern Studies Ph.D.
Classical and Near Eastern Religions and Cultures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. SE, Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnrc@umn.edu
Website: https://cla.umn.edu/cnrc

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and Near Eastern Studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching. Related special facilities include the Center for Medieval Studies, the Center for Jewish Studies, the Consortium for the Study of the Pre-Modern World, and the Program in Religions Studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
In addition to the online University application, applicants must complete the Department of Classical and Near Eastern Studies application (also available for download on the department website); other supporting materials, including recommendations and a writing sample, can be uploaded directly into the University's online application. For nonnative speakers of English, a copy of TOEFL results is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
33 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: German and a second modern research language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Outside Coursework (12 credits)
Select 12 credits outside the major in consultation with the advisor and director of graduate studies.

Thesis Credits
Take at least 24 doctoral thesis credits.
CNRC 8888 - Thesis Credits: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Religions in Antiquity
Required Coursework (9 credits)
Take the following courses. An alternative course may be applied to this requirement with director of graduate studies approval.
CNRC 8513 - Scripture and Interpretation (3.0 cr)
RELS 5001 - Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion (3.0 cr)
RELS 8190 - Comparative Seminar in Religions in Antiquity (3.0 cr)

Concentration Areas
Select one of the two following concentration areas. In addition, select a primary language of competence, and at least one secondary language of competence.

Ancient Near East and Hebrew Bible (24 credits)
This concentration area focuses on the religions, literatures, and cultures of Mesopotamia, Canaan, and Israel from the 2nd millennium BCE to the arrival of Roman rule in the first century BCE. The required primary language is Hebrew. Secondary language options are Aramaic, Akkadian, Ugaritic, or Greek.

Concentration Area Coursework (24 credits)
Select at least 24 credits from the following in consultation with the advisor. Other coursework may be applied to this requirement with advisor approval.
ANTH 4049 - Religion and Culture (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
CNRC 5071 - Greek and Hellenistic Religions (3.0 cr)
CNRC 5072 - The Birth of Christianity [AH] (3.0 cr)
CNRC 5121 - Gender and Body in Early Christianity [AH] (3.0 cr)
CNRC 5204 - The Dead Sea Scrolls (3.0 cr)
CNRC 5502W - Ancient Israel: From Conquest to Exile [WI] (3.0 cr)
CNRC 8530 - Religions of the Ancient Mediterranean World (3.0 cr)
CNRC 8550 - Gender and Body in Ancient Religion (3.0 cr)
CNRC 8570 - Readings in Religious Texts (3.0 cr)
GRK 5200 - Advanced Readings in Greek Prose (3.0 cr)
GRK 8400 - Readings in Patristic Greek (3.0 cr)
HEBR 5200 - Advanced Classical Hebrew (3.0 cr)
HEBR 5300 - Post-Biblical Hebrew: Second Temple Period (3.0 cr)
HIST 5053 - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
HIST 8110 - Medieval History: Research Seminar (3.0 cr)
HIST 8930 - Topics in Ancient History (1.0 - 4.0 cr)
LAT 5200 - Advanced Readings in Latin Prose (3.0 cr)
RELS 5013W - Biblical Law and Jewish Ethics [WI] (3.0 cr)
RELS 5071 - Greek and Hellenistic Religions (3.0 cr)
RELS 5072 - The Birth of Christianity [AH] (3.0 cr)
RELS 5121 - Gender and Body in Early Christianity [AH] (3.0 cr)

-OR-

Greek and Roman Religions, Formative Judaism, and Early Christianity (24 credits)

This concentration area focuses on the religions, literatures, and cultures of Greece, Rome, and the Mediterranean world, with potential focal points in Egypt, Asia Minor, or Syria-Palestine. It centers on the period from Alexander the Great to Marcus Aurelius, and encompasses Second Temple Judaism and early Christianity, including New Testament literature. The required primary language is Greek or Latin. Secondary language options are Hebrew, Aramaic, Copic, Greek, or Latin.

Concentration Area Coursework (24 credits)

Select at least 24 credits from the following in consultation with the advisor. Other coursework may be applied to this requirement with advisor approval.

ANTH 4049 - Religion and Culture (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
CNRC 5071 - Greek and Hellenistic Religions (3.0 cr)
CNRC 5072 - The Birth of Christianity [AH] (3.0 cr)
CNRC 5204 - The Dead Sea Scrolls (3.0 cr)
CNRC 5502W - Ancient Israel: From Conquest to Exile [WI] (3.0 cr)
CNRC 8530 - Religions of the Ancient Mediterranean World (3.0 cr)
CNRC 8550 - Gender and Body in Ancient Religion (3.0 cr)
CNRC 8570 - Readings in Religious Texts (3.0 cr)
GRK 5200 - Advanced Readings in Greek Prose (3.0 cr)
GRK 8400 - Readings in Patristic Greek (3.0 cr)
HEBR 5200 - Advanced Classical Hebrew (3.0 cr)
HEBR 5300 - Post-Biblical Hebrew: Second Temple Period (3.0 cr)
HIST 5053 - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
HIST 8110 - Medieval History: Research Seminar (3.0 cr)
HIST 8930 - Topics in Ancient History (1.0 - 4.0 cr)
LAT 5200 - Advanced Readings in Latin Prose (3.0 cr)
RELS 5013W - Biblical Law and Jewish Ethics [WI] (3.0 cr)
RELS 5071 - Greek and Hellenistic Religions (3.0 cr)
RELS 5072 - The Birth of Christianity [AH] (3.0 cr)
RELS 5121 - Gender and Body in Early Christianity [AH] (3.0 cr)

Classics

We are currently pausing admissions in Classics. The Classics track requires extensive advanced work in both Latin and Greek, together with some study in a related field or area of interest. The track requires nearly equal emphasis on courses and seminars in Greek and in Latin.

Language Requirements: German, plus another modern language, preferably French or Italian, as well as reading proficiency in both Greek and Latin, as demonstrated by a departmental examination based on a set reading list.

Language Coursework (24 credits)

Language Courses (21 credits)

Select at least 9 credits of Greek and 9 credits of Latin, in consultation with the advisor, plus additional language courses for a total of 21 credits. Of the 18 credits, at least half must be from Greek or Latin seminar courses (6 seminar credits from one language and 3 seminar credits from the other). 51xx and 52xx courses cannot be applied to this requirement.

GRK 5705 - Introduction to the Historical-Comparative Grammar of Greek and Latin (3.0 cr)
GRK 5993 - Directed Studies (1.0 - 4.0 cr)
GRK 5994 - Directed Research (1.0 - 12.0 cr)
GRK 5996 - Directed Instruction (1.0 - 12.0 cr)
GRK 8100 - Readings in Greek Prose (3.0 cr)
GRK 8120 - Greek Text Course (3.0 cr)
GRK 8200 - Readings in Greek Verse (3.0 cr)
GRK 8262 - Survey of Greek Literature I (3.0 cr)
GRK 8263 - Survey of Greek Literature II (3.0 cr)
GRK 8300 - Readings in Greek Texts (3.0 cr)
GRK 8400 - Readings in Patristic Greek (3.0 cr)
GRK 8910 - Seminar (3.0 cr)
LAT 5703 - Epigraphy (3.0 cr)
LAT 5993 - Directed Studies (1.0 - 4.0 cr)
LAT 5994 - Directed Research (1.0 - 12.0 cr)
LAT 5996 - Directed Instruction (1.0 - 12.0 cr)
LAT 8100 - Readings in Latin Prose (3.0 cr)
LAT 8120 - Latin Text Course (3.0 cr)
LAT 8200 - Readings in Latin Verse (3.0 cr)
LAT 8262 - Survey of Latin Literature I (3.0 cr)
LAT 8263 - Survey of Latin Literature II (3.0 cr)
LAT 8267 - Graduate Survey of Latin Literature of Late Antiquity (3.0 cr)
LAT 8300 - Readings in Latin Texts (3.0 cr)
LAT 8910 - Seminar (3.0 cr)

Prose Composition Course (3 credits)
Select one of the following in consultation with the advisor:
GRK 5701 - Prose Composition (3.0 cr)
LAT 5701 - Latin Prose Composition (3.0 cr)

Art or Archaeology Coursework (3 credits)
Select at least 3 credits from the following in consultation with the advisor. Other coursework may be applied to this requirement with director of graduate studies approval.
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
ANTH 5221 - Anthropology of Material Culture (3.0 cr)
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
ANTH 5401 - The Human Fossil Record (3.0 cr)
ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
ANTH 5448 - Applied Heritage Management (3.0 cr)
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)
ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)
ANTH 8230 - Anthropological Research Design (3.0 cr)
ANTH 8244 - Interpreting Ancient Bone (3.0 cr)
ANTH 8510 - Topics in Archaeology (3.0 cr)
ARTH 5335 - Baroque Rome: Art and Politics in the Papal Capital (3.0 cr)
ARTH 5787 - Visual Cultures in Contact: Cross-Cultural Interaction in the Ancient and Early Medieval Worlds (3.0 cr)
ARTH 5950 - Topics: Art History (3.0 cr)
ARTH 8190 - Seminar: Issues in Ancient Art and Archaeology (3.0 cr)
ARTH 8200 - Seminar: Medieval Art (3.0 cr)
ARTH 8710 - Seminar: Islamic Art (3.0 cr)

Ancient History Coursework (6 credits)
Select at least 6 credits in Ancient History from the following, in consultation with the director of graduate studies.
CNRC 5502W - Ancient Israel: From Conquest to Exile [WI] (3.0 cr)
HIST 5053 - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
Twin Cities Campus
Cognitive Science M.S.
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Cognitive Sciences
205 Elliott Hall
75 E. River Parkway
Minneapolis, MN 55455
Email: cogsci@umn.edu
Website: http://www.cogsciphd.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS Cognitive Science program is structured to allow students the flexibility to pursue a wide variety of research topics, and to integrate methodologies and perspectives from different disciplines. In addition to a course that introduces students to the field of Cognitive Science, at least three course credits from each of the following areas are required: cognitive psychology, computer science/artificial intelligence, linguistics, neuroscience, and philosophy.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 0 credits outside the major. The final exam is written and oral. A capstone project is required.
Capstone Project: 6 Independent Study (Plan B) project credits are required.

Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Introduction Course (3 credits)
Take the following course. A substitute course can be applied to this requirement with the approval of the director of graduate studies.
PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

Electives (17 to 27 credits)
All students must select at least 3 credits from each of the following 5 core disciplines for a total of 15 credits. Plan A students choose
an additional 2 credits, Plan B students an additional 6 credits, and Plan C students an additional 12 credits from this list to meet the 30-credit minimum. Substitute coursework can be applied to this requirement with the approval of the advisor and director of graduate studies.

**Cognitive Psychology (3 credits)**
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5031W - Perception [WI] (3.0 cr)
- PSY 5054 - Psychology of Language (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
- PSY 8010 - Advanced Topics in Learning (3.0 cr)
- PSY 8036 - Topics in Computational Vision (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)
- PSY 8055 - Seminar: Cognitive Neuroscience (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)

**Computer Science (3 credits)**
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)

**Linguistics (3 credits)**
- Please note LING 8900 may be used depending on the specific topic taken.
- LING 5001 - Introduction to Linguistics (4.0 cr)
- LING 5201 - Syntactic Theory I (3.0 cr)
- LING 5202 - Syntactic Theory II (3.0 cr)
- LING 5205 - Semantics (3.0 cr)
- LING 5206 - Linguistic Pragmatics (3.0 cr)
- LING 5207 - Advanced Semantics (3.0 cr)
- LING 5801 - Introduction to Computational Linguistics (3.0 cr)
- LING 8200 - Topics in Syntax and Semantics (3.0 cr)
- LING 8210 - Seminar in Syntax (3.0 cr)
- LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
- LING 8921 - Seminar in Language and Cognition (3.0 cr)

**Neuroscience (3 credits)**
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661 - Behavioral Neuroscience (3.0 cr)
- NSC 8217 - Systems and Computational Neuroscience (2.0 cr)
- NSCI 5551 - Statistical Foundations of Systems Neuroscience (3.0 cr)

**Philosophy (3 credits)**
- PHIL 5085 - Wittgenstein (3.0 cr)
- PHIL 5331 - Contemporary Moral Theories (3.0 cr)
- PHIL 5615 - Mind, Bodies and Machines (3.0 cr)
- PHIL 8131 - Epistemology Survey (3.0 cr)
- PHIL 8180 - Seminar: Philosophy of Language (3.0 cr)
- PHIL 8602 - Scientific Representation and Explanation (3.0 cr)
- PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
- PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)

**Plan Options**

**Plan A**

All Plan A students must take at least 10 master's thesis credits.

**CGSC 8777 - Thesis Credit: Masters (1.0 - 10.0 cr)**
-OR-

Plan B
All Plan B students must take 6 credits of the following:
CGSC 8991 - Independent Study (1.0 - 4.0 cr)
Twin Cities Campus
Cognitive Science Minor
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3570; fax: 612-626-7253)
Email: cogsci@umn.edu
Website: http://www.cogsci.cogsci.umn.edu/index.shtml

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9 to 10
- Length of program in credits (Doctorate): 12 to 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The cognitive science minor provides an opportunity for students to pursue integrated coursework, which emphasizes theory and methods in cognitive science.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Cognitive Science director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minimum cumulative GPA for coursework applied to the minor is 3.00.

Coursework
Introduction Course (3 credits)
Select the following courses, or a substitute course, with the approval of the Cognitive Science director of graduate studies.
PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

Electives (6 to 9 credits)
Master's students select at least 6 credits, and doctoral students select at least 9 credits from at least 2-3 different categories below to meet minimum requirements for the minor. Approval of the Cognitive Science director of graduate studies is required.
Cognitive Science
CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
Cognitive Psychology
CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 8112 - Mathematical Cognition (3.0 cr)
EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)

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Information current as of November 07, 2022
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5031W - Perception [WI] (3.0 cr)
PSY 5054 - Psychology of Language (3.0 cr)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5064 - Brain and Emotion (3.0 cr)
PSY 8010 - Advanced Topics in Learning (3.0 cr)
PSY 8036 - Topics in Computational Vision (3.0 cr)
PSY 8041 - Proseminar in Perception (3.0 cr)
PSY 8055 - Seminar: Cognitive Neuroscience (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)

Computer Science
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)

Linguistics
LING 5001 - Introduction to Linguistics (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5202 - Syntactic Theory II (3.0 cr)
LING 5205 - Semantics (3.0 cr)
LING 5206 - Linguistic Pragmatics (3.0 cr)
LING 5207 - Advanced Semantics (3.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
LING 8200 - Topics in Syntax and Semantics (3.0 cr)
LING 8210 - Seminar in Syntax (3.0 cr)
LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
LING 8921 - Seminar in Language and Cognition (3.0 cr)

Neuroscience
NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
NSC 8217 - Systems and Computational Neuroscience (2.0 cr)
NSCI 5551 - Statistical Foundations of Systems Neuroscience (3.0 cr)

Philosophy
PHIL 5085 - Wittgenstein (3.0 cr)
PHIL 5331 - Contemporary Moral Theories (3.0 cr)
PHIL 5615 - Mind, Bodies and Machines (3.0 cr)
PHIL 8131 - Epistemology Survey (3.0 cr)
PHIL 8180 - Seminar: Philosophy of Language (3.0 cr)
PHIL 8602 - Scientific Representation and Explanation (3.0 cr)
PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Cognitive Science Ph.D.
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3570; fax: 612-626-7253)
Email: cogsci@umn.edu
Website: http://www.cogsciphd.umn.edu/index.shtml

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Cognitive science is broadly concerned with integrating contemporary approaches to the study of mind/brain, and with the systems and processes underlying the acquisition and use of knowledge. The coherence of the program lies in its intellectual focus on cognition. This program spans cellular, behavioral, and psychological levels of scientific analysis in the study of cognition in a single unified graduate program. It integrates the diverse content, methods, and perspectives of a number of different disciplines (e.g., anthropology, biology, artificial intelligence, linguistics, neuroscience, philosophy, and psychology), which are concerned with or in some sense inform our understanding of cognition. The PhD program trains cognitive scientists to conduct research integrating methodologies and content knowledge from a variety of approaches. In order to ensure an interdisciplinary approach, each student has two co-advisors from the cognitive science graduate faculty, each representing a different discipline from within the cognitive sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applications should be received no later than December 1 of the preceding academic year. Entry is usually in fall semester but may be permitted in other semesters in exceptional cases.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grade basis must be taken A-F to be applied to major-field and elective requirements. Required coursework is described below.

**Introduction Course (3 credits)**
Select one of the following courses in consultation with the advisor. A substitute course can be applied to this requirement with approval of the director of graduate studies.

- PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
- CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)

**Electives (30 credits)**
Select at least 3 credits from each of the disciplines below, in consultation with the advisor and subject to the approval of the Cognitive Science director of graduate studies, for a total of 18 credits. The remaining 12 credits can be from the following list or other coursework as appropriate for the research focus. Advisor and DGS approval is required.

**Cognitive Psychology (3 credits)**
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5031W - Perception [WI] (3.0 cr)
- PSY 5054 - Psychology of Language (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
- PSY 8010 - Advanced Topics in Learning (3.0 cr)
- PSY 8036 - Topics in Computational Vision (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)
- PSY 8055 - Seminar: Cognitive Neuroscience (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)

**Computer Science (3 credits)**
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)

**Linguistics (3 credits)**
Please note LING 8900 may be used depending on the specific topic taken.
- LING 5001 - Introduction to Linguistics (4.0 cr)
- LING 5201 - Syntactic Theory I (3.0 cr)
- LING 5202 - Syntactic Theory II (3.0 cr)
- LING 5205 - Semantics (3.0 cr)
- LING 5206 - Linguistic Pragmatics (3.0 cr)
- LING 5207 - Advanced Semantics (3.0 cr)
- LING 5801 - Introduction to Computational Linguistics (3.0 cr)
- LING 8200 - Topics in Syntax and Semantics (3.0 cr)
- LING 8210 - Seminar in Syntax (3.0 cr)
- LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
- LING 8921 - Seminar in Language and Cognition (3.0 cr)

**Neuroscience (3 credits)**
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661 - Behavioral Neuroscience (3.0 cr)
NSC 8217 - Systems and Computational Neuroscience (2.0 cr)
NSCI 5551 - Statistical Foundations of Systems Neuroscience (3.0 cr)

**Philosophy (3 credits)**
- PHIL 5085 - Wittgenstein (3.0 cr)
- PHIL 5331 - Contemporary Moral Theories (3.0 cr)
- PHIL 5615 - Mind, Bodies and Machines (3.0 cr)
- PHIL 8131 - Epistemology Survey (3.0 cr)
- PHIL 8180 - Seminar: Philosophy of Language (3.0 cr)
- PHIL 8602 - Scientific Representation and Explanation (3.0 cr)
- PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
- PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits.
- CGSC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Research Breadth (3 Credits)**
Select at least 3 credits in consultation with the advisor and subject to the approval of the Cognitive Science director of graduate studies.
- CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
- CGSC 8991 - Independent Study (1.0 - 4.0 cr)
**Twin Cities Campus**  
Communication Studies M.A.  
Communication Studies  
College of Liberal Arts  

Link to a list of faculty for this program.

**Contact Information:**  
Department of Communication Studies, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN  55455 (612-624-5800; fax: 612-624-6544).  
Website: [https://cla.umn.edu/comm-studies](https://cla.umn.edu/comm-studies)

- Program Type: Master's  
- Requirements for this program are current for Fall 2022  
- Length of program in credits: 33  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Communication Studies graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Communication Studies PhD program.

The Communication Studies program has a national reputation for excellence in the areas of critical media studies, interpersonal communication, and rhetoric. Our graduate students are highly motivated scholars at the cutting edge of communication research with an equally strong commitment to becoming skilled instructors. Although most students emphasize one of these areas, students take courses across each of the three sub-disciplines.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.50.

**Special Application Requirements:**  
Note: The Communication Studies graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Communication Studies PhD program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**  
**Plan B:** Plan B requires 24 to 27 major credits and 6 to 9 credits outside the major. The final exam is written and oral. A capstone project is required.  
**Capstone Project:** A publishable, article-length paper consisting of the student's original research.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

**Major Coursework (24 to 27 credits)**  
Select 24 to 27 credits from the following in consultation with the advisor:  
**COMM 5110 - Special Topics in Communication Theory (3.0 cr)**  
**COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)**  
**COMM 5221 - Media, Race, and Identity (3.0 cr)**
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<tr>
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<th>Credits</th>
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<td>COMM 5261</td>
<td>Political Economy of Media Culture</td>
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<td>COMM 5411</td>
<td>Small Group Communication Research</td>
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<td>COMM 5431</td>
<td>The Process of Persuasion</td>
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<td>COMM 5441</td>
<td>Communication in Human Organizations</td>
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<td>COMM 5451W</td>
<td>Intercultural Communication Processes [WI]</td>
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<td>COMM 5611</td>
<td>Survey of Rhetorical Theory</td>
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<td>History and Criticism of U.S. Public Discourse: 1630-1865</td>
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<td>COMM 8000</td>
<td>Communication Studies Research Colloquium</td>
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<td>COMM 8101</td>
<td>Introduction to Graduate Communication Studies</td>
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<td>COMM 8402</td>
<td>Seminar: Interpersonal Communication</td>
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<td>COMM 8403</td>
<td>Seminar: Emotion and Communication</td>
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<td>COMM 8451</td>
<td>Seminar: Intercultural and Diversity Research</td>
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<td>COMM 8452</td>
<td>Seminar: Methods of Intercultural/Diversity Facilitation</td>
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<td>COMM 8502</td>
<td>Seminar: Communication Theory Construction</td>
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<td>COMM 8504</td>
<td>Seminar: Rhetorical Criticism</td>
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<td>COMM 8606</td>
<td>Seminar: Rhetorical Analysis of Campaigns and Movements</td>
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<td>Advanced Topics in Communication Studies</td>
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<td>COMM 8994</td>
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Outside Coursework (6 to 9 credits)

Select credits outside the major, in consultation with the advisor and director of graduate studies, to meet the 33-credit requirement. Other courses can be applied to this requirement with advisor approval.

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<td>AFRO 5866</td>
<td>The Civil Rights and Black Power Movement, 1954-1984</td>
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<td>AMES 5920</td>
<td>Topics in Asian Culture</td>
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<td>AMST 4101</td>
<td>Gender, Sexuality, and Politics in America [HIS, DSJ]</td>
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<td>Theoretical Foundations and Current Practice in American Studies</td>
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<td>Cultural Fallout: The Cold War and Its Legacy, Readings</td>
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<td>Ethnography, Theory, History</td>
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<td>Ethnography: Contemporary Theory and Practice</td>
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<td>ANTH 8810</td>
<td>Topics in Sociocultural Anthropology</td>
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<td>ARTH 5417</td>
<td>Twentieth Century Theory and Criticism</td>
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<td>CPSY 8302</td>
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<td>CSCL 5555</td>
<td>Introduction to Semiotics</td>
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<td>CSCL 5833</td>
<td>Marx, Freud, Nietzsche: Intellectual Foundations</td>
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<td>EMS 8100</td>
<td>Workshop in Early Modern Studies</td>
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<tr>
<td>ENGL 5140</td>
<td>Readings in 18th Century Literature and Culture</td>
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<td>ENGL 5805</td>
<td>Writing for Publication</td>
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<td>ENGL 8090</td>
<td>Seminar in Special Subjects</td>
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<td>ENGL 8150</td>
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<td>ENGL 8400</td>
<td>Seminar in Post-Colonial Literature, Culture, and Theory</td>
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<td>ENGL 8992</td>
<td>Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing</td>
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<td>EPSY 5243</td>
<td>Principles and Methods of Evaluation</td>
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<td>Survey Design, Sampling, and Implementation</td>
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<td>EPSY 5247</td>
<td>Qualitative Methods in Educational Psychology</td>
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<td>Statistical Methods in Education I</td>
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<td>Critical Issues: Criticism and Thought</td>
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<td>Conceptual Frameworks in the Family</td>
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<td>Research in Fisheries</td>
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<td>GEOG 8230</td>
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<td>Transnational Feminist Theory</td>
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<td>Black Feminist Thought in the American and African Diasporas</td>
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<td>GWSS 5502</td>
<td>Gender and Public Policy</td>
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<td>Seminar: Feminist Theory &amp; Praxis</td>
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<td>GWSS 8230</td>
<td>Seminar: Cultural Criticism and Media Studies</td>
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<td>GWSS 8250</td>
<td>Seminar: Nation, State, and Citizenship</td>
<td>(1.0 - 3.0 cr)</td>
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<td>GWSS 8490</td>
<td>Seminar: Transnational, Postcolonial, Diaspora</td>
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<td>HIST 5283</td>
<td>Marx, Capital and History: An Introduction to Marxist Theory and History</td>
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<td>Special Topics in Strategic Communication</td>
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<td>PA 5721</td>
<td>Energy Systems and Policy</td>
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<td>PSY 5204</td>
<td>Psychology of Interpersonal Relationships</td>
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<td>PSY 8203</td>
<td>Impression Management</td>
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<td>WRIT 8550</td>
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Twin Cities Campus
Communication Studies Minor
Communication Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Communication Studies, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455
(612-624-5800; fax: 612-624-6544)
Website: http://www.comm.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in Communication Studies is open to all University graduate students currently pursuing an advanced degree in another area of study. Students pursuing complementary subjects such as American Studies, Political Science, Cultural Studies, Sociology, Mass Communication, and Feminist Studies are strongly encouraged to consider pursuing a minor in Communication Studies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the Communication Studies minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Communication Studies director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All courses applied to the minor must be taken on the A-F grade basis, with a minimum grade of C+ earned for each.

The minimum cumulative GPA for minor field coursework is 3.5.

Required Coursework (6 to 12 credits)
Master's students select at least 6 credits, and doctoral students at least 12 credits from the following in consultation with the Communication Studies director of graduate studies:

COMM 5110 - Special Topics in Communication Theory (3.0 cr)
COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)
COMM 5221 - Media, Race, and Identity (3.0 cr)
COMM 5231 - Media Outlaws (3.0 cr)
COMM 5261 - Political Economy of Media Culture (3.0 cr)
COMM 5411 - Small Group Communication Research (3.0 cr)
COMM 5431 - The Process of Persuasion (3.0 cr)
COMM 5441 - Communication in Human Organizations (3.0 cr)
COMM 5451W - Intercultural Communication Processes [WI] (3.0 cr)
COMM 5611 - Survey of Rhetorical Theory (3.0 cr)
COMM 5615W - Introduction to Rhetorical Criticism [WI] (3.0 cr)
COMM 5617 - History and Criticism of U.S. Public Discourse: 1630-1865 (3.0 cr)
COMM 5970 - Directed Study (1.0 - 3.0 cr)
COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
COMM 8402 - Seminar: Interpersonal Communication (3.0 cr)
COMM 8403 - Seminar: Emotion and Communication (3.0 cr)
COMM 8451 - Seminar: Intercultural and Diversity Research (3.0 cr)
COMM 8452 - Seminar: Methods of Intercultural/Diversity Facilitation (3.0 cr)
COMM 8502 - Seminar: Communication Theory Construction (3.0 cr)
COMM 8504 - Seminar: Rhetorical Criticism (3.0 cr)
COMM 8606 - Seminar: Rhetorical Analysis of Campaigns and Movements (3.0 cr)
COMM 8611 - Seminar: Rhetoric (3.0 cr)
COMM 8625 - Seminar: Communication Ethics (3.0 cr)
COMM 8910 - Advanced Topics in Communication Studies (3.0 cr)
COMM 8994 - Directed Research (1.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Communication Studies Ph.D.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Communication Studies, 225 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-5800; fax: 612-624-6544).
Website: https://cla.umn.edu/comm-studies

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Communication Studies program has a national reputation for excellence in the areas of critical media studies, interpersonal communication, and rhetoric. Our graduate students are highly motivated scholars at the cutting edge of communication research with an equally strong commitment to becoming skilled instructors. Although most students emphasize one of these areas, students take courses across each of the three subdisciplines en route to designing their PhD thesis research project.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A bachelor's or master's degree in Communication Studies or a related field.

Other requirements to be completed before admission:
Application requirements include:
- At least 15 undergraduate or graduate credits in speech or communications courses related to the proposed emphasis area
- Transcripts of all post-secondary academic work
- Statement of purpose, including academic and professional objectives
- Diversity statement
- Sample of academic writing (15 - 25 pages)
- Three letters of recommendation
- Resume/CV

The application deadline is December 1 for the following fall semester. Admission is for fall semester only.

All prerequisites must be completed before admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
33 to 36 credits are required in the major.
9 to 12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

Coursework

Introductory Coursework (7 credits)
Take the following courses. Take COMM 8000 4 times for a total of 4 credits.
COMM 8000 - Communication Studies Research Colloquium (1.0 cr)
COMM 8101 - Introduction to Graduate Communication Studies (3.0 cr)

Research Methods (6 credits)
Select 6 credits from the following in consultation with advisor. Other courses can be applied to this requirement with advisor approval. If all 6 credits are from the department, you are required to take 12 credits from outside of the major.
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)
COMM 5411 - Small Group Communication Research (3.0 cr)
COMM 5441 - Communication in Human Organizations (3.0 cr)
COMM 5611 - Survey of Rhetorical Theory (3.0 cr)
COMM 8110 - Seminar: Communication Research Methods (3.0 cr)
COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
COMM 8504 - Seminar: Rhetorical Criticism (3.0 cr)
CSCL 5555 - Introduction to Semiotics (3.0 cr)
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
FW 8394 - Research in Fisheries (1.0 - 4.0 cr)
FW 8494 - Research in Wildlife (1.0 - 4.0 cr)
GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)

Major Coursework (20-23 credits)
Select courses from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
COMM 5110 - Special Topics in Communication Theory (3.0 cr)
COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)
COMM 5221 - Media, Race, and Identity (3.0 cr)
COMM 5231 - Media Outlaws (3.0 cr)
COMM 5261 - Political Economy of Media Culture (3.0 cr)
COMM 5411 - Small Group Communication Research (3.0 cr)
COMM 5431 - The Process of Persuasion (3.0 cr)
COMM 5441 - Communication in Human Organizations (3.0 cr)
COMM 5451W - Intercultural Communication Processes [WI] (3.0 cr)
COMM 5611 - Survey of Rhetorical Theory (3.0 cr)
COMM 5615W - Introduction to Rhetorical Criticism [WI] (3.0 cr)

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Information current as of November 07, 2022
COMM 5617 - History and Criticism of U.S. Public Discourse: 1630-1865 (3.0 cr)
COMM 5970 - Directed Study (1.0 - 3.0 cr)
COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
COMM 8402 - Seminar: Interpersonal Communication (3.0 cr)
COMM 8403 - Seminar: Emotion and Communication (3.0 cr)
COMM 8451 - Seminar: Intercultural and Diversity Research (3.0 cr)
COMM 8452 - Seminar: Methods of Intercultural/Diversity Facilitation (3.0 cr)
COMM 8502 - Seminar: Communication Theory Construction (3.0 cr)
COMM 8504 - Seminar: Rhetorical Criticism (3.0 cr)
COMM 8606 - Seminar: Rhetorical Analysis of Campaigns and Movements (3.0 cr)
COMM 8611 - Seminar: Rhetoric (3.0 cr)
COMM 8625 - Seminar: Communication Ethics (3.0 cr)
COMM 8910 - Advanced Topics in Communication Studies (3.0 cr)
COMM 8994 - Directed Research (1.0 - 3.0 cr)

Outside Coursework (9-12 credits)
Select credits outside the major in consultation with the advisor. Other courses can be applied to this requirement with advisor approval. Note that a minimum of 12 outside coursework credits is required for CLA standards. However, 3 of those credits may be covered from research methods classes taken outside of the department.

AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
AMES 5920 - Topics in Asian Culture (3.0 cr)
AMST 4101 - Gender, Sexuality, and Politics in America [HIS, DSJ] (3.0 cr)
AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
AMST 8231 - Cultural Fallout: The Cold War and Its Legacy, Readings (3.0 cr)
AMST 8920 - Topics in American Studies (3.0 cr)
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
ARTH 5417 - Twentieth Century Theory and Criticism (3.0 cr)
BTHX 8000 - Advanced Topics in Bioethics (1.0 - 4.0 cr)
CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
CPSY 8360 - Special Topics in Developmental Psychology (1.0 - 3.0 cr)
CSCL 5555 - Introduction to Semiotics (3.0 cr)
CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
CSCL 5993 - Directed Study (1.0 - 3.0 cr)
EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)
ENGL 5140 - Readings in 18th Century Literature and Culture (3.0 cr)
ENGL 5805 - Writing for Publication (3.0 cr)
ENGL 8090 - Seminar in Special Subjects (3.0 cr)
ENGL 8150 - Seminar in Shakespeare (3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
ENGL 8992 - Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing (1.0 - 9.0 cr)
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
FREN 8230 - Critical Issues: Criticism and Thought (3.0 cr)
FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
FW 8394 - Research in Fisheries (1.0 - 4.0 cr)
FW 8494 - Research in Wildlife (1.0 - 4.0 cr)
GEOG 8230 - Theoretical Geography (3.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
GWSS 5502 - Gender and Public Policy (3.0 cr)
GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
GWSS 8220 - Seminar: Critical and Media Studies (3.0 cr)
GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
HIST 5283 - Marx, Capital and History: An Introduction to Marxist Theory and History (3.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 8025 - Politics of Historical Memory (3.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
JOUR 8290 - Special Topics in Strategic Communication (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
KIN 5511 - Sport and Gender (3.0 cr)
LING 5900 - Topics in Linguistics (3.0 cr)
MIMS 8001 - Theories of the Moving Image (3.0 cr)
MIMS 8003 - Historiography of the Moving Image (3.0 cr)
OLPD 5128 - Anthropology of Education (3.0 cr)
PA 5290 - Topics in Planning (0.5 - 4.0 cr)
PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
PHIL 8510 - Seminar: Aesthetics Studies (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 8203 - Impression Management (3.0 cr)
PSY 8205 - Principles of Social Psychology (3.0 cr)
RELS 8190 - Comparative Seminar in Religions in Antiquity (3.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
SCMC 5993 - Directed Study (1.0 - 3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8311 - Political Sociology (3.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
TH 8120 - Seminar (3.0 cr)
WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)
WRIT 8510 - Seminar in Rhetoric (3.0 cr)
WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits.
COMM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Comparative Literature M.A.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: cscl@umn.edu
Website: https://cla.umn.edu/cscl/graduate

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Comparative Literature (CL) graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Comparative Literature PhD program.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, this program focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary studies, directing much of its energies toward the intersection of literature with other media (in various constellations of word, sound, and image) and literatures of the global North with those of the global South, engaging problems ranging from narrative to postcolonial studies. The curriculum emphasizes seminars and directed research.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: The Comparative Literature graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Comparative Literature PhD program.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
  - Speaking test score: 0

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Passing the Comparative Literature doctoral preliminary written and oral examinations, or completing one Plan B paper of approximately 40 pages.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

Required Courses (9 credits)
Take the following courses:
- CSCL 8001 - Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)
- CSCL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
- CSCL 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

Major Electives (9 credits)
Select credits from the following in consultation with the advisor and director of graduate studies:
- CSCL 5302 - Aesthetics and the Valuation of Art (3.0 cr)
- CSCL 5305 - Vision and Visuality: An Intellectual History (3.0 cr)
- CSCL 5331 - Discourse of the Novel (3.0 cr)
- CSCL 5401 - Origins of Cultural Studies (3.0 cr)
- CSCL 5411 - Avant-Garde Cinema (4.0 cr)
- CSCL 5555 - Introduction to Semiotics (3.0 cr)
- CSCL 5666 - Film Music: Theory, History, Practice (4.0 cr)
- CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
- CSCL 5910 - Topics in Cultural Studies and Comparative Literature (3.0 - 4.0 cr)
- CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
- CSCL 8992 - Directed Reading in Comparative Literature (1.0 - 4.0 cr)
- CSCL 8993 - Directed Study (1.0 - 4.0 cr)
- CSCL 8994 - Directed Research (1.0 - 4.0 cr)

Additional Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses, including courses from the Major Electives list not applied to that requirement, can be used with advisor and director of graduate studies approval.
- CSCL 5xxx
- CSCL 8xxx
- SCMC 5001 - Critical Debates in the Study of Cinema and Media Culture (4.0 cr)
- SCMC 5002 - Advanced Film Analysis (4.0 cr)

Outside Coursework (6 credits)
Select 6 credits of coursework outside the major in consultation with the advisor and director of graduate studies from 'CSCL 5xxx' and 'CSCL 8xxx'. Other courses can be applied to this requirement with advisor and director of graduate studies approval.
Take 6 or more credit(s) from the following:
- CSCL 5xxx
- CSCL 8xxx
Twin Cities Campus
Comparative Literature Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: cscl@umn.edu
Website: https://cla.umn.edu/cscl/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, this program focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study.

This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary studies, directing much of its energies toward the intersection of literature with other media (in various constellations of word, sound, and image) and of literatures of the global North with those of the global South, engaging problems ranging from narrative to postcolonial studies. The curriculum emphasizes seminars and directed research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Comparative Literature director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minimum cumulative GPA for minor field coursework is 3.50.

Required Courses (6 credits)
Take the following courses:
- CSCL 8001 - Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)
- CSCL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)

Electives (3 to 6 credits)
Masters students select 3 credits, and doctoral students select 6 credits from the following, in consultation with the Comparative Literature director of graduate studies. Other courses may be applied to this requirement with Comparative Literature director of graduate studies approval.
- CSCL 5302 - Aesthetics and the Valuation of Art (3.0 cr)
- CSCL 5305 - Vision and Visuality: An Intellectual History (3.0 cr)
CSCL 5331 - Discourse of the Novel (3.0 cr)
CSCL 5401 - Origins of Cultural Studies (3.0 cr)
CSCL 5411 - Avant-Garde Cinema (4.0 cr)
CSCL 5555 - Introduction to Semiotics (3.0 cr)
CSCL 5666 - Film Music: Theory, History, Practice (4.0 cr)
CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
CSCL 5910 - Topics in Cultural Studies and Comparative Literature (3.0 - 4.0 cr)
CSCL 8900 - Advanced Topics in Cultural Studies (3.0 - 4.0 cr)
CSCL 8992 - Directed Reading in Comparative Literature (1.0 - 4.0 cr)
CSCL 8993 - Directed Study (1.0 - 4.0 cr)
CSCL 8994 - Directed Research (1.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus

Comparative Literature Ph.D.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Dr SE, Minneapolis, MN (612-624-8099; fax: 612-625-4170).
Email: cscl@umn.edu
Website: https://cla.umn.edu/cscl/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, this program focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary studies, directing much of its energies toward the intersection of literature with other media (in various constellations of word, sound, and image) and literatures of the global North with those of the global South, engaging problems ranging from narrative to postcolonial studies. The curriculum emphasizes seminars and directed research.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A BS and/or MA degree in a humanities or a social science discipline, or other relevant field.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

Coursework should include at least 12 8xxx-level course credits, excluding CSCL 8001 and CSCL 8002.

Application of 4xxx-level courses toward degree requirements requires approval of the advisor and director of graduate studies.

**Required Courses (9 credits)**
Take the following courses:
- CSCL 8001 - Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)
- CSCL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
- CSCL 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

**Major Electives (12 credits)**
Select 12 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.
- CSCL 5302 - Aesthetics and the Valuation of Art (3.0 cr)
- CSCL 5305 - Vision and Visuality: An Intellectual History (3.0 cr)
- CSCL 5331 - Discourse of the Novel (3.0 cr)
- CSCL 5401 - Origins of Cultural Studies (3.0 cr)
- CSCL 5411 - Avant-Garde Cinema (4.0 cr)
- CSCL 5555 - Introduction to Semiotics (3.0 cr)
- CSCL 5666 - Film Music: Theory, History, Practice (4.0 cr)
- CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
- CSCL 5910 - Topics in Cultural Studies and Comparative Literature (3.0 - 4.0 cr)
- CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
- CSCL 8992 - Directed Reading in Comparative Literature (1.0 - 4.0 cr)
- CSCL 8993 - Directed Study (1.0 - 4.0 cr)
- CSCL 8994 - Directed Research (1.0 - 4.0 cr)

**Related Courses (9 credits)**
Select 9 credits from the following in consultation with the advisor. Other courses, including courses from the Major Electives list not applied to that requirement, can be used with advisor and director of graduate studies approval.
- CSCL 5xxx
- CSCL 8xxx
- SCMC 5001 - Critical Debates in the Study of Cinema and Media Culture (4.0 cr)
- SCMC 5002 - Advanced Film Analysis (4.0 cr)

**Outside Coursework (12 credits)**
Select 12 credits outside the major in consultation with the advisor and director of graduate studies from 'CSCL 5xxx' and 'CSCL 8xxx'. Other courses can be applied to this requirement with advisor and director of graduate studies approval.
Take 12 or more credit(s) from the following:
- CSCL 5xxx
- CSCL 8xxx

**Thesis Credits**
Take 24 doctoral thesis credits.
- CSCL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Comparative Studies in Discourse and Society M.A.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: cscl@umn.edu
Website: https://cla.umn.edu/cscl

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Comparative Studies and Discourse in Society (CSDS) graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the CSDS PhD program.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages broader topicshow discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The CSDS graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the CSDS PhD program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: Passing the doctoral preliminary written and oral examinations, or completing one Plan B paper of approximately 40 pages.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

Required Courses (9 credits)
Take the following courses:
- CSCL 8001 - Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)
- CSCL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
- CSCL 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

Major Electives (9 credits)
Select credits from the following in consultation with the advisor and director of graduate studies:
- CSCL 5302 - Aesthetics and the Valuation of Art (3.0 cr)
- CSCL 5305 - Vision and Visuality: An Intellectual History (3.0 cr)
- CSCL 5331 - Discourse of the Novel (3.0 cr)
- CSCL 5401 - Origins of Cultural Studies (3.0 cr)
- CSCL 5411 - Avant-Garde Cinema (4.0 cr)
- CSCL 5555 - Introduction to Semiotics (3.0 cr)
- CSCL 5666 - Film Music: Theory, History, Practice (4.0 cr)
- CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
- CSCL 5910 - Topics in Cultural Studies and Comparative Literature (3.0 - 4.0 cr)
- CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
- CSCL 8992 - Directed Reading in Comparative Literature (1.0 - 4.0 cr)
- CSCL 8993 - Directed Study (1.0 - 4.0 cr)
- CSCL 8994 - Directed Research (1.0 - 4.0 cr)

Related Courses (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses, including courses from the Major Electives list not applied to that requirement, can be used with advisor and director of graduate studies approval.
- CSCL 5xxx
- CSCL 8xxx
- SCMC 5001 - Critical Debates in the Study of Cinema and Media Culture (4.0 cr)
- SCMC 5002 - Advanced Film Analysis (4.0 cr)

Outside Coursework (6 credits)
Select 6 credits of coursework outside the major in consultation with the advisor and director of graduate studies from 'CSCL 5xxx' and 'CSCL 8xxx'. Other courses can be applied to this requirement with advisor and director of graduate studies approval.

Take 6 or more credit(s) from the following:
- CSCL 5xxx
- CSCL 8xxx
Twin Cities Campus
Comparative Studies in Discourse and Society Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: cscl@umn.edu
Website: https://cla.umn.edu/cscl

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic--how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Comparative Studies in Discourse and Society director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.50 is required for students to remain in good standing.

Required Courses (6 credits)
All students pursuing the minor take the following courses:

- CSCL 8001 - Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)
- CSCL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)

Electives (3 to 6 credits)
Masters students select 3 credits and doctoral students select 6 credits from the following, in consultation with the Comparative Studies in Discourse and Society director of graduate studies. Other courses may be applied to this requirement with Comparative
Program Sub-plans

Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus

Comparative Studies in Discourse and Society Ph.D.

Cultural Studies & Comparative Literature

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: cscl@umn.edu
Website: https://cla.umn.edu/cscl

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A BA and/or MA degree in a humanities or a social science discipline, or other relevant field.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

Coursework should include at least 12 8xxx-level course credits, excluding CSCL 8001, CSCL 8002, and CSCL 8901.

Application of 4xxx-level courses toward degree requirements requires approval of the advisor and director of graduate studies.

Required Courses (9 credits)
Take the following courses:
- CSCL 8001 - Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)
- CSCL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
- CSCL 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

Major Electives (12 credits)
Select 12 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.
- CSCL 5302 - Aesthetics and the Valuation of Art (3.0 cr)
- CSCL 5305 - Vision and Visuality: An Intellectual History (3.0 cr)
- CSCL 5331 - Discourse of the Novel (3.0 cr)
- CSCL 5401 - Origins of Cultural Studies (3.0 cr)
- CSCL 5411 - Avant-Garde Cinema (4.0 cr)
- CSCL 5555 - Introduction to Semiotics (3.0 cr)
- CSCL 5666 - Film Music: Theory, History, Practice (4.0 cr)
- CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
- CSCL 5910 - Topics in Cultural Studies and Comparative Literature (3.0 - 4.0 cr)
- CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
- CSCL 8992 - Directed Reading in Comparative Literature (1.0 - 4.0 cr)
- CSCL 8993 - Directed Study (1.0 - 4.0 cr)
- CSCL 8994 - Directed Research (1.0 - 4.0 cr)

Related Courses (9 credits)
Select 9 credits from the following in consultation with the advisor. Other courses, including courses from the Major Electives list not applied to that requirement, can be used with advisor and director of graduate studies approval.
- CSCL 5xxx
- CSCL 8xxx
- SCMC 5001 - Critical Debates in the Study of Cinema and Media Culture (4.0 cr)
- SCMC 5002 - Advanced Film Analysis (4.0 cr)

Outside Coursework (12 credits)
Select 12 credits outside the major in consultation with the advisor and director of graduate studies from 'CSCL 5xxx' and 'CSCL 8xxx'. Other courses can be applied to this requirement with advisor and director of graduate studies approval.
Take 12 or more credit(s) from the following:
• CSCL 5xxx
• CSCL 8xxx

Thesis Credits
Take 24 doctoral thesis credits.
- CSCL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Creative Writing M.F.A.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English, 111 Pillsbury Hall, 310 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-6366; fax: 612-624-8228)
Email: creepwrit@umn.edu
Website: http://cla.umn.edu/creative-writing

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The creative writing program in the Department of English offers the master of fine arts (MFA) degree for students committed to pursuing the writing life. This three-year degree provides advanced, graduate-level coursework in writing, language, and literature, as well as study in a related field. The third year of the program focuses on the final development of a book-length manuscript suitable for publication. At the heart of the program are writing workshops in poetry, fiction, and literary nonfiction, and courses in the "Reading as Writers" and "Topics in Advanced Writing" series, which enable writers to explore a variety of issues relating to contemporary themes in American and world literature. The program encourages experimentation across genres, fostering the discovery of new and varied forms for a developing voice. Students also have the opportunity to work editorially on "Great River Review," the graduate literary magazine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program does not require a graduate degree for admission.

Special Application Requirements:
The MFA in Creative Writing does not require undergraduate work in English literature or an undergraduate degree in literature. Students come from a variety of educational backgrounds and life experiences. Applicants should be aware, however, that graduate coursework in literature and/or language is required once admitted to the program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan C:** Plan C requires 42 major credits and 3 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The capstone project is a publishable thesis manuscript of poetry, fiction, or literary nonfiction. The final exam is an oral defense of the thesis manuscript and literary essay.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with advisor approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Required Courses (8 credits)**
Take the following courses:
- ENGW 8101 - Reading Across Genres (4.0 cr)
- ENGW 8180 - Thesis Seminar: Multi-Genre (4.0 cr)

**Literature/Language Electives (10 credits)**
Select coursework from the following in consultation with the advisor. At least 3 credits must be from ENGL courses. Other courses can be applied to this requirement with advisor and director of graduate studies approval.
- ENGL 5020 - Studies in Narrative (3.0 cr)
- ENGL 5040 - Theories of Film (3.0 cr)
- ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
- ENGL 5110 - Medieval Literatures and Cultures: Intro to Medieval Studies (3.0 cr)
- ENGL 5121 - Readings in Early Modern Literature and Culture (3.0 cr)
- ENGL 5140 - Readings in 18th Century Literature and Culture (3.0 cr)
- ENGL 5150 - Readings in 19th-Century Literature and Culture (3.0 cr)
- ENGL 5170 - Readings in 20th-Century Literature and Culture (3.0 cr)
- ENGL 5300 - Readings in American Minority Literature (3.0 cr)
- ENGL 5501 - Origins of Cultural Studies (3.0 cr)
- ENGL 5510 - Readings in Criticism and Theory (3.0 cr)
- ENGL 5593 - The African-American Novel (3.0 cr)
- ENGL 5701 - Great River Review (4.0 cr)
- ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
- ENGL 5805 - Writing for Publication (3.0 cr)
- ENGL 5992 - Directed Readings, Study, or Research (1.0 - 3.0 cr)
- ENGL 8090 - Seminar in Special Subjects (3.0 cr)
- ENGL 8110 - Seminar: Medieval Literature and Culture (3.0 cr)
- ENGL 8120 - Seminar in Early Modern Literature and Culture (3.0 cr)
- ENGL 8140 - Seminar in 18th Century Literature and Culture (3.0 cr)
- ENGL 8150 - Seminar in Shakespeare (3.0 cr)
- ENGL 8170 - Seminar in 19th Century British Literature and Culture (3.0 cr)
- ENGL 8180 - Seminar in 20th-Century British Literature and Culture (3.0 cr)
- ENGL 8190 - Seminar in 20th-Century Anglophone Literatures and Cultures (3.0 cr)
- ENGL 8200 - Seminar in American Literature (3.0 cr)
- ENGL 8290 - Topics, Figures, and Themes in American Literature (3.0 cr)
- ENGL 8300 - Seminar in American Minority Literature (3.0 cr)
- ENGL 8600 - Seminar in Language, Rhetoric, Literacy, and Composition (3.0 cr)
- ENGL 8610 - Seminar in Language and Discourse Studies (3.0 cr)
- ENGW 5130 - Topics in Graduate Creative Writing (4.0 cr)
- ENGW 5310 - Reading as Writers (4.0 cr)
- ENGW 5701 - Great River Review (4.0 cr)
- ENGW 5993 - Directed Study in Writing (1.0 - 4.0 cr)
- ENGW 8110 - Seminar: Writing of Fiction (4.0 cr)
- ENGW 8120 - Seminar: Writing of Poetry (4.0 cr)
- ENGW 8130 - Seminar: Writing of Literary Nonfiction (4.0 cr)

**MFA Creative Thesis (4 credits)**
Take ENGW 8990 in consultation with the advisor.
- ENGW 8990 - MFA Creative Thesis (2.0 - 8.0 cr)

**Creative Writing Electives (4 credits)**
Select 4 credits from the following in consultation with the advisor:
- ENGW 5102 - Graduate Fiction Writing (4.0 cr)
- ENGW 5104 - Graduate Poetry Writing (4.0 cr)
ENGW 5106 - Graduate Literary Nonfiction Writing (4.0 cr)
ENGW 5130 - Topics in Graduate Creative Writing (4.0 cr)
ENGW 5310 - Reading as Writers (4.0 cr)
ENGW 5606W - Literary Aspects of Journalism [WI] (3.0 cr)
ENGW 5701 - Great River Review (4.0 cr)
ENGW 5993 - Directed Study in Writing (1.0 - 4.0 cr)
ENGW 8110 - Seminar: Writing of Fiction (4.0 cr)
ENGW 8120 - Seminar: Writing of Poetry (4.0 cr)
ENGW 8130 - Seminar: Writing of Literary Nonfiction (4.0 cr)

Outside Coursework (3 credits)
Select at least 3 credits outside the English department in consultation with the advisor.

Genres

Fiction Genre (16 credits)
Complete coursework in consultation with advisor. ENGW 5102 must be completed twice.
ENGW 5102 - Graduate Fiction Writing (4.0 cr)
ENGW 8110 - Seminar: Writing of Fiction (4.0 cr)

Secondary Genre
Select one of the following:
ENGW 5104 - Graduate Poetry Writing (4.0 cr)
ENGW 5106 - Graduate Literary Nonfiction Writing (4.0 cr)
ENGW 5130 - Topics in Graduate Creative Writing (4.0 cr)

-OR-

Nonfiction Genre (16 credits)
Complete coursework in consultation with advisor. ENGW 5106 must be completed twice.
ENGW 5106 - Graduate Literary Nonfiction Writing (4.0 cr)
ENGW 8130 - Seminar: Writing of Literary Nonfiction (4.0 cr)

Secondary Genre
Select one of the following:
ENGW 5102 - Graduate Fiction Writing (4.0 cr)
ENGW 5104 - Graduate Poetry Writing (4.0 cr)
ENGW 5130 - Topics in Graduate Creative Writing (4.0 cr)

-OR-

Poetry Genre (16 credits)
Complete coursework in consultation with advisor. ENGW 5104 must be completed twice.
ENGW 5104 - Graduate Poetry Writing (4.0 cr)
ENGW 8120 - Seminar: Writing of Poetry (4.0 cr)

Secondary Genre
Select one of the following:
ENGW 5102 - Graduate Fiction Writing (4.0 cr)
ENGW 5106 - Graduate Literary Nonfiction Writing (4.0 cr)
ENGW 5130 - Topics in Graduate Creative Writing (4.0 cr)
Twin Cities Campus
Developmental Studies and Social Change Minor
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Interdisciplinary Center for the Study of Global Change, University of Minnesota, 537 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455 (612-624-0832; fax: 612-625-1879)
Email: icgc@umn.edu
Website: http://www.icgc.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor is administered by the Interdisciplinary Center for the Study of Global Change (ICGC) and is open to University graduate students interested in a structured program of study in an interdisciplinary and globally oriented field. By focusing on the social basis of change in the global south, the minor program engages a wide range of academic disciplines, including the social sciences, humanities, and biological sciences. Among the broad themes addressed in minor program seminars: social and environmental change; human rights and human security; development; international peace and conflict; and arts and humanities perspectives on global social justice. The minor program focuses on three areas: (1) The relationships between large-scale processes of political, economic, and social change, and the particular conditions of lived experience in the global south; (2) Specifically interdisciplinary perspectives (encompassing the social sciences, the biological sciences, and the humanities) on this general thematic concern; and (3) Preparation of masters and doctoral students to conduct interdisciplinary and international research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Required: Enrollment in a University masters or doctoral program
Preferred: Applicants with an ICGC fellowship

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the director of graduate studies for the minor regarding feasibility and requirements.

Applications to the minor are accepted on a rolling basis.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Electives (3 credits)
Select at least 3 elective credits in consultation with major advisor and the DSSC director of graduate studies. Other courses may be substituted with the approval of the DSSC Director of Graduate Studies. Coursework from the major program cannot be applied to this requirement.

Afro-American Studies
AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AFRO 5103</td>
<td>World History and Africa (3.0 cr)</td>
</tr>
<tr>
<td>AFRO 5120</td>
<td>Social and Intellectual Movements in the African Diaspora (3.0 cr)</td>
</tr>
<tr>
<td>AFRO 5191</td>
<td>Seminar: The African American Experience in South Africa (3.0 cr)</td>
</tr>
<tr>
<td>AFRO 5910</td>
<td>Topics in African American and African Studies (3.0 cr)</td>
</tr>
<tr>
<td>AFRO 8202</td>
<td>Seminar: Intellectual History of Race (3.0 cr)</td>
</tr>
<tr>
<td>AFRO 8554</td>
<td>Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)</td>
</tr>
<tr>
<td>AFRO 8910</td>
<td>Topics in Studies of Africa and the African Diaspora (3.0 cr)</td>
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**American Indian Studies**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>AMIN 5409</td>
<td>American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)</td>
</tr>
<tr>
<td>AMIN 5890</td>
<td>Readings in American Indian and Indigenous History (3.0 cr)</td>
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**American Studies**

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<th>Course Title</th>
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<tbody>
<tr>
<td>AMST 8239</td>
<td>Gender, Race, Class, Ethnicity, and Sexuality in the United States: Readings (3.0 cr)</td>
</tr>
<tr>
<td>AMST 8240</td>
<td>Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development (3.0 cr)</td>
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**Anthropology**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ANTH 8001</td>
<td>Ethnography, Theory, History (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8002</td>
<td>Ethnography: Contemporary Theory and Practice (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8120</td>
<td>Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)</td>
</tr>
<tr>
<td>ANTH 8203</td>
<td>Research Methods in Social and Cultural Anthropology (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8205</td>
<td>Economic Anthropology (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8207</td>
<td>Political and Social Anthropology (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8213</td>
<td>Ecological Anthropology (3.0 cr)</td>
</tr>
<tr>
<td>ANTH 8215</td>
<td>Anthropology of Gender (3.0 cr)</td>
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**Apparel Studies**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>APEC 5321</td>
<td>Regional Economic Analysis (3.0 cr)</td>
</tr>
<tr>
<td>APEC 5511</td>
<td>Labor Economics (3.0 cr)</td>
</tr>
<tr>
<td>APEC 5731</td>
<td>Economic Growth and International Development (3.0 cr)</td>
</tr>
<tr>
<td>APEC 5751</td>
<td>Global Trade and Policy (3.0 cr)</td>
</tr>
<tr>
<td>APEC 8601</td>
<td>Natural Resource Economics (3.0 cr)</td>
</tr>
<tr>
<td>APEC 8602</td>
<td>Economics of the Environment (3.0 cr)</td>
</tr>
<tr>
<td>APEC 8701</td>
<td>Trade and Development I (2.0 cr)</td>
</tr>
<tr>
<td>APEC 8702</td>
<td>Trade and Development II (2.0 cr)</td>
</tr>
</tbody>
</table>

**Chicano Studies**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>CHIC 5920</td>
<td>Topics in Chicana(o) Studies (3.0 cr)</td>
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**Communication Studies**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>COMM 8211</td>
<td>Critical Communication Studies: History, Theory, Method (3.0 cr)</td>
</tr>
<tr>
<td>COMM 8451</td>
<td>Seminar: Intercultural and Diversity Research (3.0 cr)</td>
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</tbody>
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**Comparative Literature and Cultural Studies**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCL 8001</td>
<td>Basic Research Seminar in Cultural Studies and Comparative Literature I (3.0 cr)</td>
</tr>
<tr>
<td>CSCL 8002</td>
<td>Basic Research Seminar in Comparative Literature II (3.0 cr)</td>
</tr>
<tr>
<td>CSCL 8362</td>
<td>Modernity and Its Others (4.0 cr)</td>
</tr>
<tr>
<td>CSCL 8910</td>
<td>Advanced Topics in Comparative Literature (3.0 - 4.0 cr)</td>
</tr>
<tr>
<td>CSCL 8920</td>
<td>Advanced Topics in Comparative Literature (3.0 cr)</td>
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**Conservation Biology**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CONS 8095</td>
<td>Contemporary Problems in Conservation Biology (1.0 cr)</td>
</tr>
</tbody>
</table>

**Curriculum and Instruction Design**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>DES 5165</td>
<td>Design and Globalization (3.0 cr)</td>
</tr>
<tr>
<td>DES 8166</td>
<td>Material Culture and Design (3.0 cr)</td>
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</table>

**Economics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECON 8311</td>
<td>Economic Growth and Development (2.0 cr)</td>
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<tr>
<td>ECON 8312</td>
<td>Economic Growth and Development (2.0 cr)</td>
</tr>
<tr>
<td>ECON 8313</td>
<td>Economic Growth and Development (2.0 cr)</td>
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<tr>
<td>ECON 8381</td>
<td>Advanced Topics in Economic Development (2.0 cr)</td>
</tr>
<tr>
<td>ECON 8391</td>
<td>Workshop in Economic Growth and Development (1.0 cr)</td>
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<tr>
<td>ECON 8401</td>
<td>International Trade and Payments Theory (2.0 cr)</td>
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<tr>
<td>ECON 8402</td>
<td>International Trade and Payments Theory (2.0 cr)</td>
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<tr>
<td>ECON 8403</td>
<td>International Trade and Payments Theory (2.0 cr)</td>
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<td>ECON 8404</td>
<td>International Trade and Payments Theory (2.0 cr)</td>
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<tr>
<td>ECON 8481</td>
<td>Advanced Topics in International Trade (2.0 cr)</td>
</tr>
<tr>
<td>ECON 8482</td>
<td>Advanced Topics in International Trade (2.0 cr)</td>
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<tr>
<td>ECON 8491</td>
<td>Workshop in Trade and Development (1.0 cr)</td>
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<tr>
<td>ECON 8492</td>
<td>Workshop in Trade and Development (1.0 - 3.0 cr)</td>
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**English Literature**

<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>ENGL 5510</td>
<td>Readings in Criticism and Theory (3.0 cr)</td>
</tr>
<tr>
<td>ENGL 8190</td>
<td>Seminar in 20th-Century Anglophone Literatures and Cultures (3.0 cr)</td>
</tr>
</tbody>
</table>
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
ENGL 8510 - Studies in Criticism and Theory (3.0 cr)
ENGL 8520 - Seminar: Cultural Theory and Practice (3.0 cr)
ENGL 8530 - Seminar in Feminist Criticism (3.0 cr)

**Environmental Sciences, Policy and Management**
ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
ESPM 5261 - Economics and Natural Resources Management (4.0 cr)

**Fisheries and Wildlife**
FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
FW 8452 - Conservation Biology (3.0 cr)

**French**

**Geography**
GEOG 5385 - Globalization and Development: Political Economy (4.0 cr)
GEOG 8005 - Proseminar: Population Geography (3.0 cr)
GEOG 8007 - Proseminar: Theories of Development and Change (3.0 cr)
GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
GEOG 8212 - Africa (3.0 cr)
GEOG 8213 - East Asia and China (3.0 cr)
GEOG 8214 - South Asia (3.0 cr)
GEOG 8220 - Agrarian Change and Rural Development (3.0 cr)
GEOG 8240 - Medical Geography (3.0 cr)
GEOG 8301 - Feminist Literary Criticism (3.0 cr)
GEOG 8306 - Development Theory and the State (3.0 cr)

**Gender, Women, and Sexuality Studies**
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 5290 - Topics: Biology, Health, and Environmental Studies (3.0 cr)
GWSS 5390 - Topics: Visual, Cultural, and Literary Studies (3.0 cr)
GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
GWSS 8101 - Intellectual History of Feminism (3.0 cr)
GWSS 8102 - Advanced Studies in Sexuality (3.0 cr)
GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)
GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
GWSS 8301 - Feminist Literary Criticism (3.0 cr)

**Global Studies**
GLOS 5900 - Topics in Global Studies (1.0 - 4.0 cr)

**History**
HIST 5468 - Social Change in Modern China (3.0 cr)
HIST 5479 [Inactive](3.0 cr)
HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)
HIST 5901 - Latin America Proseminar: Colonial (3.0 cr)
HIST 5902 - Latin America Proseminar: Modern (3.0 cr)
HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
HIST 5980 - Topics in Comparative Women's History (3.0 - 4.0 cr)
HIST 8239 - Readings in Gender, Race, Class, and/or Ethnicity in the United States (3.0 cr)
HIST 8240 - Topics in Research in Gender, Race, Class, or Ethnicity in the United States (3.0 cr)
HIST 8245 - Human Rights: A Global History (3.0 cr)
HIST 8390 - Research in American Indian History (3.0 cr)
HIST 8464 - Research in Yuan, Ming, and Qing History (3.0 cr)
HIST 8465 - Research in Yuan, Ming, and Qing History (3.0 cr)
HIST 8630 - Seminar in World History (3.0 cr)
HIST 8709 - Seminar: History of Sexuality (3.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
HIST 8944 - Research Seminar: New Directions in African Social History I (3.0 cr)
HIST 8945 - Research Seminar: New Directions in African Social History II (3.0 cr)
HIST 8950 - Topics in Latin American History (1.0 - 4.0 cr)
HIST 8990 - Topics in Comparative History Research (3.0 cr)

**History of Science and Technology**
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
HSCI 5331 - Technology and American Culture (3.0 cr)
HSCI 5332 - Science in the Shaping of America (3.0 cr)
HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)

Housing Studies

Journalism and Mass Communication
JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
JOUR 8721 - Media Organizations as Institutions (3.0 cr)
JOUR 8801 - Seminar: Comparative Research in Mass Communication, a Cross-National Approach (3.0 cr)

Music
MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

Organizational Leadership, Policy and Development
OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5121 - Educational Reform in International Context (3.0 cr)
OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
OLPD 5128 - Anthropology of Education (3.0 cr)
OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
OLPD 8121 - Doctoral Seminar: Comparative and International Development Education (1.0 - 6.0 cr)

Philosophy
PHIL 8600 - Workshop in the Philosophy of Science (1.0 cr)
PHIL 8660 - Seminar: Social and Cultural Studies of Science (3.0 cr)
PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)

Political Science
POL 8235 - Democratic Theory (3.0 cr)
POL 8275 - Contemporary Political Thought (3.0 cr)
POL 8401 - International Relations (3.0 cr)
POL 8402 - International Security (3.0 cr)
POL 8403 - International Norms and Institutions (3.0 cr)
POL 8404 - International Hierarchy (3.0 cr)
POL 8405 - International Political Economy (3.0 cr)
POL 8406 - Politics of International Finance (3.0 cr)
POL 8407 - Morality in World Politics (3.0 cr)
POL 8408 - International Relations of the Environment (3.0 cr)
POL 8411 - Political Psychology and Foreign Policy (3.0 cr)
POL 8412 - American Foreign Policy (3.0 cr)
POL 8460 - Topics in International Relations (3.0 cr)
POL 8601 - Introduction to Comparative Politics (3.0 cr)
POL 8605 - Government and Politics in Africa (3.0 cr)
POL 8606 - Government and Politics of Russia and the Commonwealth of Independent States (3.0 cr)
POL 8611 - Chinese Politics (3.0 cr)
POL 8619 - Latin American Politics (3.0 cr)
POL 8633 - Comparative Sociopolitical Change (3.0 cr)
POL 8637 - Comparative Political Economy (3.0 cr)
POL 8641 - Comparative Mass Political Behavior (3.0 cr)
POL 8643 - Comparative Political Institutions (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)

Portuguese

Public Affairs
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5421 - Racial Inequality and Public Policy (3.0 cr)
PA 5451 [Inactive](3.0 cr)
PA 5480 - Topics in Race, Ethnicity, and Public Policy (1.0 - 3.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5511 - Community Economic Development (3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)
PA 5522 - International Development Policy, Families, and Health (3.0 cr)
PA 5590 - Topics in Economic and Community Development (1.0 - 3.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)
PA 8811 [Inactive](3.0 cr)
Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Required Courses (5 credits)
Take the following courses in consultation with the DSSC director of graduate studies. Take DSSC 8310 for 1 credit.

- DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
- DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
- DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)

Doctoral

Required Courses (9 credits)
Take the following courses in consultation with the DSSC director of graduate studies. Take DSSC 8310 for 2 credits.

- DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
- DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
- DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)

Take 2 or more credit(s) from the following:

- DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
Twin Cities Campus
Early Modern Studies Minor
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Email: emsdgs@umn.edu
Website: http://www.cemh.umn.edu/minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Early Modern Studies (EMS) minor encourages inquiry into the early modern period, roughly 1300 to 1800 C.E., using insights and perspectives from multiple disciplines. The minor provides graduate students with solid grounding in the theories and multi-disciplinary methods used by scholars studying the early modern period; and draws electives from courses offered by departments across the College of Liberal Arts as well as the History of Science, Technology, and Medicine graduate program. The University has numerous library collections and research centers that include a focus on the early modern period. For more information on the minor, visit www.cemh.umn.edu/minor.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Early Modern Studies director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses applied to the minor that are offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B earned for each.

The minimum cumulative GPA for minor field coursework is 3.0.

Required Courses (4 to 6 credits)
Take the following courses in consultation with the EMS director of graduate studies. Masters students take 1 credit, and doctoral students take 3 credits of EMS 8100. Doctoral students may register for EMS 8100 in any credit combination.
EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)

Electives (3 to 6 credits)
Masters students select 3 elective credits, and doctoral students select 6 elective credits from the following to complete minimum credit requirements. Other courses can be applied to this requirement with approval of the EMS director of graduate studies.
ARCH 5423 - Gothic Architecture (3.0 cr)
ARCH 5424 - Renaissance Architecture (3.0 cr)
ARCH 5425 - Baroque Architecture (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Economics M.A.
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econbas@umn.edu
Website: https://cla.umn.edu/economics/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only for the PhD in economics; the MA is an optional part of the PhD program.

The economics graduate program offers degree work in both theoretical and applied fields of economics with an emphasis on quantitative economic analysis. The strong quantitative component in this degree emphasizes multivariate calculus, linear algebra, and econometrics (statistical methods of economic data). Economics coursework consists of microeconomic theory, macroeconomic theory, economic growth, price theory, cost-benefit analysis, econometrics, economic modelling and forecasting, industrial organization, economic development, game theory, optimization theory, and financial, computational, international, mathematical, monetary, public, and labor economics. Fields of specialization and written preliminary examinations include microeconomic theory, macroeconomic theory, econometrics, economic growth and development, financial economics, game theory, computational economics, industrial organization, labor economics, international economics, mathematical economics, monetary economics, and public economics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: The Economics graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Economics PhD program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written. A capstone project is required. Capstone Project: Two Plan B projects consisting of research papers or literature reviews are required; the PhD written preliminary exams required in two fields outside of economic theory ("field exams") may be used to satisfy either or both of the Plan B projects.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of C earned for each.

Required Core Courses (16 Credits)
Take the following courses for 16 credits:
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECON 8101</td>
<td>Microeconomic Theory (2.0 cr)</td>
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<tr>
<td>ECON 8102</td>
<td>Microeconomic Theory (2.0 cr)</td>
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<tr>
<td>ECON 8103</td>
<td>Microeconomic Theory (2.0 cr)</td>
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<tr>
<td>ECON 8104</td>
<td>Microeconomic Theory (2.0 cr)</td>
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<td>ECON 8106</td>
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<td>ECON 8107</td>
<td>Macroeconomic Theory (2.0 cr)</td>
</tr>
<tr>
<td>ECON 8108</td>
<td>Macroeconomic Theory (2.0 cr)</td>
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</table>

**Economics Electives (8 Credits)**

Select at 8 credits of electives. ECON 8990 cannot be used to meet degree requirements.

ECON 8xxx

**Outside Coursework (6 Credits)**

Take at least 6 credits outside the major. Courses are selected in consultation with the director of graduate studies. ECON 8990 cannot be used to meet degree requirements.

CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
FINA 8810 - Topics in Asset Pricing (2.0 cr)
FINA 8812 - Corporate Finance I (2.0 cr)
FINA 8820 - Topics in Corporate Finance (2.0 cr)
IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8201 - General Algebra (3.0 cr)
MATH 8271 - Lie Groups and Lie Algebras (3.0 cr)
MATH 8301 - Manifolds and Topology (3.0 cr)
MATH 8302 - Manifolds and Topology (3.0 cr)
MATH 8306 - Algebraic Topology (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8501 - Differential Equations and Dynamical Systems I (3.0 cr)
MATH 8502 - Differential Equations and Dynamical Systems II (3.0 cr)
MATH 8520 - Topics in Dynamical Systems (1.0 - 3.0 cr)
MATH 8571 - Theory of Evolutionary Equations (3.0 cr)
MATH 8572 - Theory of Evolutionary Equations (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8590 - Topics in Partial Differential Equations (1.0 - 3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8659 - Stochastic Processes (3.0 cr)
NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5064 - Brain and Emotion (3.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)
Twin Cities Campus
Economics Minor
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econfgs@umn.edu
Website: https://cla.umn.edu/economics/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The economics graduate program offers degree work in both theoretical and applied fields of economics with an emphasis on quantitative economic analysis. The strong quantitative component in this degree emphasizes multivariate calculus, linear algebra, and econometrics (statistical methods of economic data). Economics coursework consists of microeconomic theory, macroeconomic theory, economic growth, price theory, cost-benefit analysis, econometrics, economic modelling and forecasting, industrial organization, economic development, game theory, optimization theory, and financial, computational, international, mathematical, monetary, public, and labor economics. Fields of specialization and written preliminary examinations include microeconomic theory, macroeconomic theory, econometrics, economic growth and development, financial economics, game theory, computational economics, industrial organization, labor economics, international economics, mathematical economics, monetary economics, and public economics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the Economics minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Economics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All courses must be taken A-F and completed with grades of B or better (one 8xxx-level course may carry a grade of C).

The minimum cumulative GPA for minor field coursework is 3.0.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
All coursework must be pre-approved by the Economics director of graduate studies. Students without previous coursework equivalent to the 4-level economic theory courses must take at least 4 credits of 4-level micro analysis, 4-level macro theory, 8-level micro theory, or 8-level macro theory coursework.
Coursework (6 credits)
Select 6 credits from the following in consultation with the Economics director of graduate studies:

ECON 4161 - Microeconomic Analysis I (2.0 cr)
ECON 4162 - Microeconomic Analysis II (2.0 cr)
ECON 4163 - Microeconomic Analysis III (2.0 cr)
ECON 4164 - Microeconomic Analysis IV (2.0 cr)
ECON 4165 - Macroeconomic Theory (2.0 cr)
ECON 4166 - Macroeconomic Theory (2.0 cr)
ECON 4167 - Macroeconomic Theory (2.0 cr)
ECON 4168 - Macroeconomic Theory (2.0 cr)
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)
ECON 8105 - Macroeconomic Theory (2.0 cr)
ECON 8106 - Macroeconomic Theory (2.0 cr)
ECON 8107 - Macroeconomic Theory (2.0 cr)
ECON 8108 - Macroeconomic Theory (2.0 cr)

Doctoral
All courses must be selected in consultation with the Economics director of graduate studies.

Sequence Requirement (8 credits)
Select 8 credits from the following in consultation with the Economics director of graduate studies:

Microeconomic Theory Sequence
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)

Macroeconomic Theory Sequence
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
- ECON 8107 - Macroeconomic Theory (2.0 cr)
- ECON 8108 - Macroeconomic Theory (2.0 cr)

Electives (4 credits)
Select 4 credits from the following course sequences in consultation with the Economics director of graduate studies. Selected coursework must be taken in the order in which its sequence is offered.

- ECON 8117 - Noncooperative Game Theory (2.0 cr)
- ECON 8118 - Noncooperative Game Theory (2.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)
- ECON 8311 - Economic Growth and Development (2.0 cr)
- ECON 8312 - Economic Growth and Development (2.0 cr)
- ECON 8401 - International Trade and Payments Theory (2.0 cr)
- ECON 8402 - International Trade and Payments Theory (2.0 cr)
- ECON 8403 - International Trade and Payments Theory (2.0 cr)
- ECON 8501 - Wages and Employment (2.0 cr)
- ECON 8502 - Wages and Employment (2.0 cr)
- ECON 8503 - Wages and Employment (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8701 - Monetary Economics (2.0 cr)
- ECON 8702 - Monetary Economics (2.0 cr)
- ECON 8703 - Monetary Economics (2.0 cr)
- ECON 8704 - Financial Economics (2.0 cr)
- ECON 8705 - Financial Economics (2.0 cr)
- ECON 8801 - Public Economics (2.0 cr)
- ECON 8802 - Public Economics (2.0 cr)
- ECON 8803 - Public Economics (2.0 cr)
Twin Cities Campus
Economics Ph.D.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econdos@umn.edu
Website: https://cla.umn.edu/economics/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only for the PhD in economics; the MA is an optional part of the PhD program. The economics graduate program offers degree work in both theoretical and applied fields of economics with an emphasis on quantitative economic analysis. The strong quantitative component in this degree emphasizes multivariate calculus, linear algebra, and econometrics (statistical methods of economic data). Economics coursework consists of microeconomic theory, macroeconomic theory, economic growth, price theory, cost-benefit analysis, econometrics, economic modelling and forecasting, industrial organization, economic development, game theory, optimization theory, and financial, computational, international, mathematical, monetary, public, and labor economics. Fields of specialization and written preliminary examinations include microeconomic theory, macroeconomic theory, econometrics, economic growth and development, financial economics, game theory, computational economics, industrial organization, labor economics, international economics, mathematical economics, monetary economics, and public economics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Special Application Requirements:
Coursework in linear algebra and multivariate calculus is required.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Quantitative Reasoning: 162

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 7.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.20 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Coursework offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of C earned.

The number of courses taken to prepare for the preliminary examinations is determined through consultation with the advisor.

Students may begin doctoral thesis credit registration, with advisor approval starting Year 2 of the program.

**Required Core Courses (16 credits)**
Take the following courses for 16 credits:
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
- ECON 8107 - Macroeconomic Theory (2.0 cr)
- ECON 8108 - Macroeconomic Theory (2.0 cr)

**Electives (8 credits)**
Select 8 credits from the following in consultation with the advisor. ECON 8990 cannot be used to meet degree requirements.
- ECON 8xxx

**Outside Coursework (12 credits)**
Courses are selected in consultation with the director of graduate studies. ECON 8990 cannot be used to meet degree requirements.
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
- FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
- FINA 8810 - Topics in Asset Pricing (2.0 cr)
- FINA 8812 - Corporate Finance I (2.0 cr)
- FINA 8820 - Topics in Corporate Finance (2.0 cr)
- IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
- MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
- MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
- MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
- MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
- MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
- MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
- MATH 8201 - General Algebra (3.0 cr)
- MATH 8271 - Lie Groups and Lie Algebras (3.0 cr)
- MATH 8301 - Manifolds and Topology (3.0 cr)
- MATH 8302 - Manifolds and Topology (3.0 cr)
- MATH 8306 - Algebraic Topology (3.0 cr)
- MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
- MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
- MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
- MATH 8501 - Differential Equations and Dynamical Systems I (3.0 cr)
- MATH 8502 - Differential Equations and Dynamical Systems II (3.0 cr)
MATH 8520 - Topics in Dynamical Systems (1.0 - 3.0 cr)
MATH 8571 - Theory of Evolutionary Equations (3.0 cr)
MATH 8572 - Theory of Evolutionary Equations (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8590 - Topics in Partial Differential Equations (1.0 - 3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8659 - Stochastic Processes (3.0 cr)
NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5064 - Brain and Emotion (3.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
ECON 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
English M.A.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228).
Email: graden@umn.edu
Website: https://cla.umn.edu/english

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the discipline—the traditional study of the literatures and languages in English—as well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to re-imagine its future shape.

The department offers a master of arts in English language and literature. The MA offers training in the areas of literary history, literary theory and interpretation, language, linguistics, rhetoric, and composition. Students in the MA can develop specific concentrations through consultation with the director of graduate studies.

Course requirements for the MA program are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
A minimum of four courses in English, three of which must be at the upper-division level, is required for degree program admission. The courses should be widely distributed.

Special Application Requirements:
Required admission materials include three letters of recommendation; a short essay explaining scholarly, professional, and personal goals and reason(s) for choosing the University of Minnesota; and a writing sample, such as a course paper. Candidates for all degrees are admitted fall semester only; all materials must be received by December 1st.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 105
- IELTS
  - Total Score: 7.5
- MELAB
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is made up of three Plan B papers. Each is a tightly argued essay of about 5,000 words, usually a reworking of a paper done originally for a course.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: A reading knowledge of one language.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Course (3 credits)

Take the following course:

ENGL 5001 - Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University (3.0 cr)

Major Electives (21 credits)

Select two areas of emphasis to be defined in consultation with the director of graduate studies. One emphasis must comprise at least 12 credits and the other at least 9 credits, chosen in consultation with the advisor and director of graduate studies.

ENGL 5020 - Studies in Narrative (3.0 cr)
ENGL 5040 - Theories of Film (3.0 cr)
ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
ENGL 5110 - Medieval Literatures and Cultures: Intro to Medieval Studies (3.0 cr)
ENGL 5121 - Readings in Early Modern Literature and Culture (3.0 cr)
ENGL 5140 - Readings in 18th Century Literature and Culture (3.0 cr)
ENGL 5150 - Readings in 19th Century Literature and Culture (3.0 cr)
ENGL 5170 - Readings in 20th Century Literature and Culture (3.0 cr)
ENGL 5300 - Readings in American Minority Literature (3.0 cr)
ENGL 5501 - Origins of Cultural Studies (3.0 cr)
ENGL 5510 - Readings in Criticism and Theory (3.0 cr)
ENGL 5530 - The African-American Novel (3.0 cr)
ENGL 5553 - The African-American Novel (3.0 cr)
ENGL 5701 - Great River Review (4.0 cr)
ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
ENGL 5805 - Writing for Publication (3.0 cr)
ENGL 5992 - Directed Readings, Study, or Research (1.0 - 3.0 cr)
ENGL 8090 - Seminar in American Literature (3.0 cr)
ENGL 8110 - Seminar: Medieval Literature and Culture (3.0 cr)
ENGL 8120 - Seminar in Early Modern Literature and Culture (3.0 cr)
ENGL 8140 - Seminar in 18th Century Literature and Culture (3.0 cr)
ENGL 8150 - Seminar in Shakespeare (3.0 cr)
ENGL 8170 - Seminar in 19th Century British Literature and Culture (3.0 cr)
ENGL 8180 - Seminar in 20th Century British Literature and Culture (3.0 cr)
ENGL 8190 - Seminar in 20th Century Anglophone Literatures and Cultures (3.0 cr)
ENGL 8200 - Seminar in American Literature (3.0 cr)
ENGL 8290 - Topics, Figures, and Themes in American Literature (3.0 cr)
ENGL 8300 - Seminar in American Minority Literature (3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
ENGL 8510 - Studies in Criticism and Theory (3.0 cr)
ENGL 8520 - Seminar: Cultural Theory and Practice (3.0 cr)
ENGL 8530 - Seminar in Feminist Criticism (3.0 cr)
ENGL 8600 - Seminar in Language, Rhetoric, Literacy, and Composition (3.0 cr)
ENGL 8610 - Seminar in Language and Discourse Studies (3.0 cr)
ENGL 8992 - Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing (1.0 - 9.0 cr)

Outside Coursework (6 credits)
Select 6 credits outside the major from the following, in consultation with the director of graduate studies:

**AFRO 5866** - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)

**AMIN 5402** - American Indians and the Cinema [AH, DSJ] (3.0 cr)

**CI 5404** - Multicultural Literature for Children and Adolescents (3.0 cr)

**CI 8400** - Special Topics in Children's and Young Adult Literature (1.0 - 6.0 cr)

**GER 5xxx**

**GWSS 8260** - Seminar: Race, Representation and Resistance (3.0 cr)

**GWSS 8270** - Seminar: Theories of Body (3.0 cr)

**HIST 5xxx**

**SCAN 5xxx**

**TH 5xxx**
Twin Cities Campus
English Minor
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, 207 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228)
Email: gradeng@umn.edu
Website: https://cla.umn.edu/english

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

During the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the discipline—the traditional study of the literatures and languages in English as well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to reimagine its future shape.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the English director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minimum cumulative GPA for minor field coursework is 3.00.

Coursework (6 to 12 credits)
Master's students select 9 credits, and doctoral students select 12 credits from the following in consultation with the English director of graduate studies.

- ENGL 5020 - Studies in Narrative (3.0 cr)
- ENGL 5040 - Theories of Film (3.0 cr)
- ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
- ENGL 5110 - Medieval Literatures and Cultures: Intro to Medieval Studies (3.0 cr)
- ENGL 5121 - Readings in Early Modern Literature and Culture (3.0 cr)
- ENGL 5140 - Readings in 18th Century Literature and Culture (3.0 cr)

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ENGL 5150 - Readings in 19th-Century Literature and Culture (3.0 cr)
ENGL 5170 - Readings in 20th-Century Literature and Culture (3.0 cr)
ENGL 5300 - Readings in American Minority Literature (3.0 cr)
ENGL 5501 - Origins of Cultural Studies (3.0 cr)
ENGL 5510 - Readings in Criticism and Theory (3.0 cr)
ENGL 5593 - The African-American Novel (3.0 cr)
ENGL 5701 - Great River Review (4.0 cr)
ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
ENGL 5805 - Writing for Publication (3.0 cr)
ENGL 5992 - Directed Readings, Study, or Research (1.0 - 3.0 cr)
ENGL 8090 - Seminar in Special Subjects (3.0 cr)
ENGL 8110 - Seminar: Medieval Literature and Culture (3.0 cr)
ENGL 8120 - Seminar in Early Modern Literature and Culture (3.0 cr)
ENGL 8140 - Seminar in 18th Century Literature and Culture (3.0 cr)
ENGL 8150 - Seminar in Shakespeare (3.0 cr)
ENGL 8170 - Seminar in 19th-Century British Literature and Culture (3.0 cr)
ENGL 8180 - Seminar in 20th-Century British Literature and Culture (3.0 cr)
ENGL 8190 - Seminar in 20th-Century Anglophone Literatures and Cultures (3.0 cr)
ENGL 8200 - Seminar in American Literature (3.0 cr)
ENGL 8290 - Topics, Figures, and Themes in American Literature (3.0 cr)
ENGL 8300 - Seminar in American Minority Literature (3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
ENGL 8510 - Studies in Criticism and Theory (3.0 cr)
ENGL 8520 - Seminar: Cultural Theory and Practice (3.0 cr)
ENGL 8530 - Seminar in Feminist Criticism (3.0 cr)
ENGL 8600 - Seminar in Language, Rhetoric, Literacy, and Composition (3.0 cr)
ENGL 8610 - Seminar in Language and Discourse Studies (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the disciplinethe traditional study of the literatures and languages in Englishas well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to re-imagine its future shape.

Course requirements for the PhD program are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
A minimum of four courses in English, three of which must be at the upper division level, is required. The courses should be widely distributed.

Special Application Requirements:
Required application materials include three letters of recommendation; a short essay explaining scholarly, professional, and personal goals and reason(s) for choosing the University of Minnesota; and a writing sample, such as a course paper. Candidates are admitted fall semester only; all materials must be received by December 1st.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 105
  - Paper Based - Total Score: 620
• IELTS
  - Total Score: 7.5
• MELAB
  - Final score: 88
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
27 to 33 credits are required in the major.
6 to 12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Read knowledge of 2 languages, or proficiency in 1

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

ENGL 5800 is required for English PhD students regardless of previous pedagogical training or teaching experience

Required Courses (6 Credits)
Take the following courses. Take ENGL 5800 for 3 credits.

ENGL 5001 - Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University (3.0 cr)
ENGL 5800 - Practicum in the Teaching of English (1.0 - 3.0 cr)

Major Electives (21 to 27 credits)
Select at least 12 credits from the chosen emphasis area, plus 9 credits from 3 categories other than the emphasis area, to meet the 21-credit requirement. Up to 6 additional credits from this list may be applied to the outside coursework requirement. The area of emphasis and all courses must be selected in consultation with the advisor and director of graduate studies.

ENGL 5020 - Studies in Narrative (3.0 cr)
ENGL 5040 - Theories of Film (3.0 cr)
ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
ENGL 5110 - Medieval Literatures and Cultures: Intro to Medieval Studies (3.0 cr)
ENGL 5121 - Readings in Early Modern Literature and Culture (3.0 cr)
ENGL 5140 - Readings in 18th Century Literature and Culture (3.0 cr)
ENGL 5150 - Readings in 19th-Century Literature and Culture (3.0 cr)
ENGL 5170 - Readings in 20th-Century Literature and Culture (3.0 cr)
ENGL 5300 - Readings in American Minority Literature (3.0 cr)
ENGL 5501 - Origins of Cultural Studies (3.0 cr)
ENGL 5510 - Readings in Criticism and Theory (3.0 cr)
ENGL 5593 - The African-American Novel (3.0 cr)
ENGL 5701 - Great River Review (4.0 cr)
ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
ENGL 5805 - Writing for Publication (3.0 cr)
ENGL 5992 - Directed Readings, Study, or Research (1.0 - 3.0 cr)
ENGL 8090 - Seminar in Special Subjects (3.0 cr)
ENGL 8110 - Seminar: Medieval Literature and Culture (3.0 cr)
ENGL 8120 - Seminar in Early Modern Literature and Culture (3.0 cr)
ENGL 8140 - Seminar in 18th Century Literature and Culture (3.0 cr)
ENGL 8150 - Seminar in Shakespeare (3.0 cr)
ENGL 8170 - Seminar in 19th-Century British Literature and Culture (3.0 cr)
ENGL 8180 - Seminar in 20th-Century British Literature and Culture (3.0 cr)
ENGL 8190 - Seminar in 20th-Century Anglophone Literatures and Cultures (3.0 cr)
ENGL 8200 - Seminar in American Literature (3.0 cr)
ENGL 8290 - Topics, Figures, and Themes in American Literature (3.0 cr)
ENGL 8300 - Seminar in African American Literature (3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
ENGL 8510 - Studies in Criticism and Theory (3.0 cr)
ENGL 8520 - Seminar: Cultural Theory and Practice (3.0 cr)
ENGL 8530 - Seminar in Feminist Criticism (3.0 cr)
ENGL 8600 - Seminar in Language, Rhetoric, Literacy, and Composition (3.0 cr)
ENGL 8610 - Seminar in Language and Discourse Studies (3.0 cr)

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Information current as of November 07, 2022

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ENGL 8992 - Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing (1.0 - 9.0 cr)

**Outside Coursework (6 to 12 Credits)**
Select 12 credits from the following in consultation with the advisor. Students applying 6 Major Electives credits to this requirement must select at least 6 additional credits of outside coursework to complete the 12-credit requirement.

AFRO 5xxx
AFRO 8xxx
AMIN 5xxx
AMIN 8xxx
ARTH 5xxx
ARTH 8xxx
CI 5xxx
CI 8xxx
CL 8xxx
CSCL 5xxx
ENGW 5xxx
FREN 8110 - Topics in Early Medieval French Literature (3.0 cr)
FREN 8114 - Troubadour Lyric and Old Occitan Language (3.0 cr)
FREN 8230 - Critical Issues: Criticism and Thought (3.0 cr)
GER 5xxx
GER 8xxx
GLOS 5403 - Human Rights Advocacy (3.0 cr)
GLOS 5900 - Topics in Global Studies (1.0 - 4.0 cr)
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)
GWSS 8270 - Seminar: Theories of Body (3.0 cr)
HIST 5xxx
HIST 8xxx
LAT 5xxx
LAT 8xxx
LAW 6702 - Legal History Workshop (2.0 cr)
LAW 6718 - Immigration and Criminal Law: Immigration Consequences of Crimes and Criminalizing Migration (2.0 cr)
LAW 6886 - International Human Rights Law (3.0 cr)
SCAN 5xxx
TH 5xxx
TH 8xxx
WRIT 5531 - Introduction to Writing Theory and Pedagogies (3.0 cr)
WRIT 5671 - Visual Rhetoric (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits.
ENGL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Feminist and Critical Sexuality Studies Minor

Gender, Women and Sexuality

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-6006)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

- Program Type: Graduate minor related to major
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor program in Feminist and Critical Sexuality Studies is located in the Department of Gender, Women, and Sexuality Studies (GWSS). The minor is designed for students with widely flexible interests and academic aims looking for advanced graduate academic training in feminist and critical sexuality studies. The program is also designed to provide an interdisciplinary graduate program in GLBTQ studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Feminist and Critical Sexuality Studies director of graduate studies regarding feasibility and requirements.

Students must submit a letter of application to the Director of Graduate Studies in the Department of Gender, Women and Sexuality Studies articulating a clear relationship between their doctoral research and the goals, curriculum, and scholarly resources of the minor. A focus or strong interest in interdisciplinary work is preferred.

A prerequisite undergraduate major or minor in gender, women and/or GLBTQ/sexuality studies is preferred. General knowledge of relevant scholarship in some combination of previous coursework, research and writing, and/or organizational activity/experience is expected.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

All coursework applied to the minor must be taken on the A-F grade basis.

The minimum cumulative GPA for minor field coursework is 3.75.

Required Courses (3 credits)
Select one of the following courses in consultation with the Feminist and Critical Sexuality director of graduate studies:
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)
Electives (12 credits)
Select courses from the following in consultation with the Feminist and Critical Sexuality director of graduate studies. Other courses may be applied with director of graduate studies approval.

GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
GWSS 5290 - Topics: Biology, Health, and Environmental Studies (3.0 cr)
GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)
GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
GWSS 8270 - Seminar: Theories of Body (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Feminist Studies M.A.
Gender, Women and Sexuality
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-6006)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 40
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Feminist Studies graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Feminist PhD program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Note: The Feminist Studies graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Feminist PhD program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 28 major credits and 12 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.
Required Core and Colloquia (16 credits)

Required Core (12 credits)

Take the following courses:

GWSS 8107 - Feminist Pedagogies (3.0 cr)
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)

Take one of the following courses. Students completing GWSS 8997 must take it for 3 credits.

AMST 8801 - Dissertation Seminar (3.0 cr)
or DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)
or GWSS 8997 - Dissertation Seminar (3.0 cr)

Required Colloquia (4 credits)

Take GWSS 8996 for 1 credit 4 times for a total of 4 credits.
GWSS 8996 - Feminist Studies Colloquium (1.0 cr)

GWSS Seminars (6 credits)

Select 6 credits from the following:

GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)
GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
GWSS 8270 - Seminar: Theories of Body (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
GWSS 8993 - Directed Study (1.0 - 6.0 cr)

Research Methods & Tools (6 credits)

Take at least 6 credits from the following list. Substitute courses can be applied to this requirement with the approval of the director of graduate studies.

AMST 8201 - Historical Foundations of American Studies (3.0 cr)
AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
HSPH 8002 - Core Practices in Heritage Studies and Public History (3.0 cr)
HSPH 8006 - Digital Methods for Heritage Studies & Public History (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)

Outside Coursework (12 credits)

Take at least 12 credits outside the major in consultation with the advisor.

AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
AFRO 8590 - Contemporary Literary and Cultural Studies (3.0 cr)
AFRO 8910 - Topics in Studies of Africa and the African Diaspora (3.0 cr)
AMES 5866 - Gender and Sexuality in Modern Arabic Literature (3.0 cr)
AMES 8001 - Critical Approaches to Asian and Middle Eastern Studies (3.0 cr)
AMIN 8301 - Critical Indigenous Theory (3.0 cr)
AMIN 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
AMST 8920 - Topics in American Studies (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
BTHX 8510 - Gender and the Politics of Health (3.0 cr)
COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)
COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
COMM 8910 - Advanced Topics in Communication Studies (3.0 cr)
CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)
DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
GEOG 8230 - Theoretical Geography (3.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)
HSPH 8001 - Who Owns the Past? Common Concerns and Big Questions in Heritage and Public History (3.0 cr)
HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
PHIL 8710 - Seminar: Feminist Philosophy (3.0 cr)
POL 8253 - Late Modern Political Thought (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
**Twin Cities Campus**

**Feminist Studies Ph.D.**

*Gender, Women and Sexuality*

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**

Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-6006)

Email: gwss@umn.edu

Website: [http://www.gwss.umn.edu](http://www.gwss.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 67
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Ph.D in Feminist Studies is designed to help students develop a high level of competence in feminist theories, research methods, interdisciplinarity, and pedagogies. Our graduates demonstrate a high level of competence in interdisciplinary feminist theories, research methods, and pedagogies. Our graduate program provides a rigorous interdisciplinary education designed to develop well-prepared scholars in the field of feminist studies and gender, women, and sexuality studies. Feminist studies PhD students pursue general and specialized courses in feminist studies while conducting scholarly research and analysis that truly drives change. Our graduate students are scholars, teachers, and activists, bringing to their work remarkable intelligence and a commitment to analyzing how power operates in and across societies, economies, and cultures. To guarantee a high level of interdisciplinary exchange, the program is designed to bring feminist studies doctoral students together with graduate minor students who are pursuing a disciplinary specialty in their own home department. Along with feminist studies, the contribution of queer and trans* studies in regard to gender, sexuality, and biological bodies is also a central component of our graduate program. We offer a wide variety of courses, with emphases in:

- Critical race and transnational feminisms
- Social movements
- Critical gender and sexualities, trans*, and queer studies
- Feminist ethnography and geography
- Feminist health, medicine, and science studies
- Intersections of race, ethnicity, and nationalism

**Program Delivery**

This program is available:

* via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:

Preferred but not required:

- Academic training/undergraduate degree in gender, women, and/or sexuality studies, or related field
- Masters degree in gender, women, and sexuality studies or a related field
- Activist or political advocacy in these areas is considered but not required

**Special Application Requirements:**

Applicants must submit three letters of recommendation, a writing sample, a current curriculum vitae, and a clearly written statement of
career interests, goals, and objectives. The application deadline is December 1; all applications are evaluated once each year in December. Graduate study in the program begins in the fall semester following admission.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

31 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Students may take up to two courses S/N, in consultation with the director of graduate studies.

**Interdisciplinary Core and Required Courses (19 credits)**

**Required Core (12 credits)**
Take the following courses:
- GWSS 8107 - Feminist Pedagogies (3.0 cr)
- GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
- GWSS 8109 - Feminist Knowledge Production (3.0 cr)
- GWSS 8111 - Transnational Feminist Theories (3.0 cr)

**Dissertation Workshop Requirement (3 credits)**
Select one of the following in consultation with the advisor. GWSS 8997, if selected, must be taken for 3 credits.
- GWSS 8997 - Dissertation Seminar (3.0 cr)
  or DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)

**Colloquia Credits (4 credits)**
Take 1 credit of GWSS 8996 for 4 semesters for a total of 4 credits. When registered for GWSS 8996, participation in all colloquium presentations and discussions, and written reflections on the presentations, is required. This course does not count towards the overall S/N limit.
- GWSS 8996 - Feminist Studies Colloquium (1.0 cr)

**GWSS Seminars (6 credits)**
Take 6 credits from the following in consultation with the advisor:
- GWSS 5104 - Transnational Feminist Theory (3.0 cr)
- GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
- GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
- GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
- GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)
GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
GWSS 8270 - Seminar: Theories of Body (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
GWSS 8993 - Directed Study (1.0 - 6.0 cr)

Research Methods and Tools (6 credits)
Select at least 6 credits from the list below, or in consultation with the director of graduate studies. Up to 6 of these credits can be applied to the 12-credit requirement for outside coursework.

- AMST 8201 - Historical Foundations of American Studies (3.0 cr)
- ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)
- COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
- CSCL 8910 - Advanced Topics in Comparative Literature (3.0 - 4.0 cr)
- ENGL 8610 - Seminar in Language and Discourse Studies (3.0 cr)
- GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
- HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
- HIST 8031 - Doing Digital History (3.0 cr)
- HIST 8122 - Public Histories (3.0 cr)
- HSPH 8002 - Core Practices in Heritage Studies and Public History (3.0 cr)
- HSPH 8006 - Digital Methods for Heritage Studies & Public History (3.0 cr)
- SOC 8801 - Sociological Research Methods (4.0 cr)

Outside Coursework (6 to 12 credits)
Take 6 to 12 credits from the following, in consultation with the director of graduate studies, to complete the required 12 credits of outside coursework. Other courses may be applied to this requirement with director of graduate studies approval.

- AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
- AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
- AFRO 8910 - Topics in Studies of Africa and the African Diaspora (3.0 cr)
- AMES 5866 - Gender and Sexuality in Modern Arabic Literature (3.0 cr)
- AMES 5920 - Topics in Asian Culture (3.0 cr)
- AMES 8993 - Directed Study (1.0 - 4.0 cr)
- AMIN 8301 - Critical Indigenous Theory (3.0 cr)
- AMST 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
- AMST 8920 - Topics in American Studies (3.0 cr)
- AMST 8970 - Independent Study in American Studies (1.0 - 9.0 cr)
- ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
- ANTH 8992 - Directed Reading (1.0 - 18.0 cr)
- ARAB 5040 - Readings in Arabic Texts (2.0 - 4.0 cr)
- ARAB 5993 - Directed Studies (1.0 - 5.0 cr)
- BTHX 5520 - Social Justice and Bioethics (3.0 cr)
- CHIC 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
- CHIC 5920 - Topics in Chicana(o) Studies (3.0 cr)
- CHIC 5993 - Directed Studies (1.0 - 3.0 cr)
- COMM 5211 - Critical Media Studies: Theory and Methods (3.0 cr)
- COMM 5221 - Media, Race, and Identity (3.0 cr)
- COMM 8210 - Seminar: Selected Topics in U.S. Electronic Media (3.0 cr)
- COMM 8894 - Directed Research (1.0 - 3.0 cr)
- DNCE 5993 - Directed Studies (1.0 - 4.0 cr)
- DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
- DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
- DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
- ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
- ENGL 8610 - Seminar in Language and Discourse Studies (3.0 cr)
- ENGW 8120 - Seminar: Writing of Poetry (4.0 cr)
- ENGW 8130 - Seminar: Writing of Literary Nonfiction (4.0 cr)
- GEOG 8230 - Theoretical Geography (3.0 cr)
- GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
- GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)
- GIS 5576 - Spatial Digital Humanities (3.0 cr)
- GLOS 5403 - Human Rights Advocacy (3.0 cr)
- GLOS 5993 - Directed Studies (1.0 - 4.0 cr)
- HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
PHIL 8110 - Seminar: Metaphysics (3.0 cr)
PHIL 8510 - Seminar: Aesthetics Studies (3.0 cr)
POL 8201 - Understanding Political Theory (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
PUBH 6115 - Worker Protection Law (1.0 cr)
SOC 8093 - Directed Study (1.0 - 4.0 cr)
TH 8120 - Seminar (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits.
GWSS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
**Twin Cities Campus**

**French M.A.**  
French & Italian  
College of Liberal Arts

Link to a list of faculty for this program.

**Contact Information:**  
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-626-0418, fax: 612-624-6021)  
Email: frit@umn.edu  
Website: [http://www.frit.umn.edu](http://www.frit.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2022  
- Length of program in credits: 30 to 34  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The French program, which offers MA and PhD degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, cinema studies, and francophone studies.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
Other requirements to be completed before admission:  
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, a sample of their academic writing, evidence of spoken French proficiency (audio sample or phone interview), and a written statement of research interests and goals.

**Special Application Requirements:**  
A BA in French (or equivalent), with a literary emphasis, is required for the MA programs. Applicants have generally completed at least 18 credits in French literature and culture. Prospective students whose undergraduate degree is in another field, but who have taken substantial coursework in French and are strongly motivated to pursue literary studies, are invited to contact the director of graduate studies in French.

International applicants must submit score(s) from one of the following tests:  
- **TOEFL**  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
- **IELTS**  
  - Total Score: 6.5  
- **MELAB**  
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grade basis must be taken A-F.

Pro-seminar (2 credits)
Take the following course:
FREN 5265 - Graduate Proseminar in French Studies (2.0 cr)

Seminars (12 to 18 credits)
Plan A students select 4 seminars, including at least 1 seminar from 3 of the 4 areas for a total of 12 credits. Plan B students select 6 seminars, including at least 1 seminar from each of the following 4 areas, for a total of 18 credits. Other courses may be substituted with advisor approval.

1500 to 1800
FREN 8200 - Topics in Early Modern French & Francophone Literatures and Cultures (3.0 cr)
FREN 8271 - The Novel of the Ancien Regime (3.0 cr)
FRIT 5240 - Topics in French & Italian Literatures & Cultures (3.0 cr)

1800 to Present
FREN 8210 - Narrative, History, and Memory: Topics (3.0 cr)
FREN 8220 - Staging the Common (3.0 cr)
FREN 8291 - Jean Genet's Writings and French Institutions (3.0 cr)
FREN 8371 - The Rule of Reason, The Reign of Madness: Readings in Early Modern France (3.0 cr)

Francophone/Global French
FREN 8230 - Critical Issues: Criticism and Thought (3.0 cr)
FREN 8240 - Critical Issues: French and Francophone Cinema (3.0 cr)
FREN 8280 - Ethics and Aesthetics in French and Francophone Writing (3.0 cr)
FREN 8410 - Topics in Quebecois Literature (3.0 cr)
FREN 8420 - Critical Issues: Francophone Literature (3.0 cr)

Other French Culture
FREN 5350 - Topics in Literature and Culture (3.0 cr)
FREN 5614 - Disabled Bodies, Minds and Selves in French Literature, Culture and Art (3.0 cr)

Pedagogy Seminar (3 credits)
Take the following course:
FRIT 5999 - Teaching of French and Italian: Theory and Practice (3.0 cr)

Practicum (1 credits)
Take the following course:
FREN 5995 - Directed Teaching (1.0 cr)

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor.

Plan Options

Plan A
Plan A students take 10 master's thesis credits.
FREN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
French Minor
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Email: frit@umn.edu
Website: http://www.frit.umn.edu

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework applied to the minor must be taken on the A-F grade basis, with a minimum grade of B- earned for each course.

Coursework (9 to 12 credits)
Masters students select 9 credits, and doctoral students select 12 credits from the following in consultation with the French director of graduate studies.
FREN 8200 - Topics in Early Modern French & Francophone Literatures and Cultures (3.0 cr)
FREN 8210 - Narrative, History, and Memory: Topics (3.0 cr)
FREN 8220 - Staging the Common (3.0 cr)
FREN 8230 - Critical Issues: Criticism and Thought (3.0 cr)
FREN 8240 - Critical Issues: French and Francophone Cinema (3.0 cr)
FREN 8271 - The Novel of the Ancien Regime (3.0 cr)
FREN 8280 - Ethics and Aesthetics in French and Francophone Writing (3.0 cr)
FREN 8291 - Jean Genet's Writings and French Institutions (3.0 cr)
FREN 8371 - The Rule of Reason, The Reign of Madness: Readings in Early Modern France (3.0 cr)
FREN 8410 - Topics in Quebecois Literature (3.0 cr)
FREN 8420 - Critical Issues: Francophone Literature (3.0 cr)
FRIT 5240 - Topics in French & Italian Literatures & Cultures (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
French Ph.D.
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-626-0418; fax: 612-624-6021).
Email: frit@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 78
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The French PhD program covers all areas of French literature and culture from the renaissance to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, early modern studies, cinema studies, disability studies, and francophone studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An MA in French (or equivalent) is required.

Other requirements to be completed before admission:
Applicants have generally completed at least 18 credits in French literature and culture. Prospective students whose undergraduate degree is in another field, but who have taken substantial coursework in French and are strongly motivated to pursue literary studies, are invited to contact the director of graduate studies in French.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, a sample of their academic writing, and a written statement of research interests and goals. Students may be contacted for evidence of spoken French proficiency (via a phone interview or other). International student applicants should also submit scores for the TOEFL or equivalent English proficiency testing program. The program offers funding packages; see https://cla.umn.edu/french-italian/graduate/funding for information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
45 credits are required in the major.
9 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in foreign language other than French

A minimum GPA of 2.8 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B- earned for each course.

Required Courses (6 credits)
Take the following courses:
FREN 5999 - Teaching of French and Italian: Theory and Practice (3.0 cr)
FREN 5995 - Directed Teaching (1.0 cr)
FREN 5265 - Graduate Proseminar in French Studies (2.0 cr)

Major Electives (39 credits)
Include at least 1 seminar from each of the 3 areas (Premodern, Modern, Francophone) in consultation with the advisor. Other courses may be substituted with advisor approval. Other courses may be substituted with advisor approval.

Premodern
FREN 8200 - Topics in Early Modern French & Francophone Literatures and Cultures (3.0 cr)
FREN 8271 - The Novel of the Ancien Regime (3.0 cr)
FREN 5240 - Topics in French & Italian Literatures & Cultures (3.0 cr)

Modern
FREN 8210 - Narrative, History, and Memory: Topics (3.0 cr)
FREN 8220 - Staging the Common (3.0 cr)
FREN 8291 - Jean Genet's Writings and French Institutions (3.0 cr)
FREN 8371 - The Rule of Reason, The Reign of Madness: Readings in Early Modern France (3.0 cr)

Francophone/Global French
FREN 8230 - Critical Issues: Criticism and Thought (3.0 cr)
FREN 8240 - Critical Issues: French and Francophone Cinema (3.0 cr)
FREN 8280 - Ethics and Aesthetics in French and Francophone Writing (3.0 cr)
FREN 8410 - Topics in Quebecois Literature (3.0 cr)
FREN 8420 - Critical Issues: Francophone Literature (3.0 cr)

Francophone/Other French Culture
FREN 5350 - Topics in Literature and Culture (3.0 cr)
FREN 5614 - Disabled Bodies, Minds and Selves in French Literature, Culture and Art (3.0 cr)

Outside Coursework (9 credits)
Select 9 credits outside the major in consultation with the advisor. Foreign language credits cannot be applied to this requirement.

Thesis Credits
Take 24 doctoral thesis credits.
FREN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Geographic Information Science M.G.I.S.
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-1498; fax: 612-624-1044)
Email: mgis@umn.edu
Website: http://cla.umn.edu/mgis

- Program Type: Master’s
- Requirements for this program are current for Fall 2022
- Length of program in credits: 35
- This program does not require summer semesters for timely completion.
- Degree: Master of Geographic Information Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The professional master of geographic information science (MGIS), administered by the Department of Geography, provides graduate-level work in the theory, applications, and technology of geographic information science (GIS). Courses for the program are divided into three broad categories. Core courses provide the conceptual and theoretical underpinnings for a comprehensive, well-rounded knowledge of GIS; a set of technology courses focuses on specific software and techniques of GIS; and elective courses provide additional breadth to the program by allowing students to take courses related to their area of interest.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Completion of a college-level course in statistics and computer programming, either through previous coursework or online (subject to approval by the GIS director of graduate studies), prior to or during the first year of the MGIS program.

Special Application Requirements:
Applicants must submit an application form; transcripts; a clearly written personal statement of career interests and goals; and three letters of recommendation from persons familiar with their academic and/or employment background. The GRE is not required. All materials must be submitted by January 30 for fall semester entrance and by September 1 for spring semester entrance.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
• IELTS
  - Total Score: 7.5
• MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements

Plan C: Plan C requires 29 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete a professional portfolio, and a set of concluding experiences including a public presentation, an exit survey, and a final meeting with an advisor.

Required Courses (13 credits)
Take the following courses in consultation with the advisor. Courses must be taken A-F, with a minimum grade of B- earned for each.

FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
or GEOG 5561 - Principles of Geographic Information Science (4.0 cr)

GIS 5571 - ArcGIS I (3.0 cr)
GIS 5572 - ArcGIS II (3.0 cr)
GIS 8501 - GIS Project Management and Professional Development (3.0 cr)

Advanced GIS Focus Courses (6 credits)
Select at least 3 credits of 5-level coursework and at least 3 credits of 8-level coursework from the following in consultation with the advisor. If FNRM 8205 is selected, it must be taken for at least 3 credits. If GIS 8990 is selected, it must be taken for at least 3 credits. Courses must be taken A-F with a minimum grade of B- earned for each.

CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
GEOG 5543 - Advanced Geocomputing (3.0 cr)
GEOG 5562 - GIS Development Practicum (3.0 cr)
GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
GEOG 5588 - Advanced Geovisualization (3.0 cr)
GIS 5574 - Web GIS and Services (3.0 cr)
GIS 5577 - Spatial Database Design and Administration (3.0 cr)
GIS 5578 - GIS Programming (3.0 cr)

Electives (10 credits)
Select at least 10 elective credits from the following in consultation with the advisor. Other courses, including those listed in the Outside Coursework requirement below, can be applied to this requirement with adviser approval.

GEOG 5511 - Principles of Cartography (4.0 cr)
GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
GEOG 5541 - Principles of Geocomputing (3.0 cr)
GEOG 5543 - Advanced Geocomputing (3.0 cr)
GEOG 5562 - GIS Development Practicum (3.0 cr)
GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
GEOG 5588 - Advanced Geovisualization (3.0 cr)
GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
GEOG 8293 - CyberGIS (3.0 cr)
GEOG 8294 - Spatiotemporal Modeling and Simulation (3.0 cr)
GIS 8990 - Research Problems in GIS (1.0 - 6.0 cr)

Outside Coursework (6 credits)
Courses taken outside the program may be applied with the approval of an advisor.
GIS 5578 - GIS Programming (3.0 cr)
GIS 8990 - Research Problems in GIS (1.0 - 6.0 cr)

Outside Coursework (6 credits)
Select at least 6 credits from the following in consultation with the advisor. Digital Archaeology must be taken if Anth 5980 is chosen.

ANTH 5980 - Topics in Anthropology (3.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 4131 - Internet Programming (3.0 cr)
CSCI 4707 - Practice of Database Systems (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5216 - Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)
FNRM 5228 - Advanced Topics in Assessment and Modeling of Forests (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
FNRM 5562 - Field Remote Sensing (1.0 cr)
FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
GDES 5341 - Interaction Design (3.0 cr)
GDES 5342 - Advanced Web Design (3.0 cr)
GDES 5371 - Data & Information Visualization (3.0 cr)
INET 6041 - Information Technology Management (2.0 cr)
IDSC 6423 - Enterprise Systems (2.0 cr)
INET 4061 - Data Science I: Fundamentals (4.0 cr)
INET 4707 - Introduction to Databases (4.0 cr)
INET 4710 - Data Science II: Big Data Analytics (4.0 cr)
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)
MSBA 6311 - Programming for Data Science (3.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6411 - Exploratory Data Analytics (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5928 - Data Management and Visualization with R (1.0 cr)
PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
Twin Cities Campus
Geographic Information Science Minor
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-1498; fax: 612-624-1044).
Email: mgis@umn.edu
Website: http://cla.umn.edu/mgis

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The professional master of geographic information science (MGIS), administered by the Department of Geography, offers a master's and doctoral minor.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
The Geographic Information Science (GIS) minor is available to University masters and doctoral students. Students interested in the minor are strongly encouraged to confer first with their major field advisor and director of graduate studies, and the GIS director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor is developed in consultation with the Geographic Information Science director of graduate studies.

Coursework that is offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B- earned. The minimum cumulative GPA for the minor field coursework is 3.00.

Required Course (3-4 credits)
Select 1 of the following introductory courses. Students who have completed an introductory GIS course may substitute a 3-credit course with approval of the GIS director of graduate studies.
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
or
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)

Electives
Select credits in consultation with the GIS director of graduate studies to meet the 9-credit minimum for the masters minor or 12-credit minimum for the doctoral minor. Digital Archaeology is required if ANTH 5980 is chosen.
ANTH 5980 - Topics in Anthropology (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ESPM 5031</td>
<td>Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)</td>
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<tr>
<td>ESPM 5295</td>
<td>GIS in Environmental Science and Management (4.0 cr)</td>
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<tr>
<td>FNRM 5216</td>
<td>Geodesy, Coordinate, and Surveying Calculations for GIS Professionals (1.0 cr)</td>
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<td>FNRM 5262</td>
<td>Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)</td>
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<td>FNRM 5362</td>
<td>Drones: Data, Analysis, and Operations (3.0 cr)</td>
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<tr>
<td>FNRM 5462</td>
<td>Advanced Remote Sensing and Geospatial Analysis (3.0 cr)</td>
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<tr>
<td>GEOG 5511</td>
<td>Principles of Cartography (4.0 cr)</td>
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<tr>
<td>GEOG 5541</td>
<td>Principles of Geocomputing (3.0 cr)</td>
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<td>Seminar in GIS and Cartography (3.0 cr)</td>
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<td>GEOG 8291</td>
<td>Seminar in GIS, Technology, and Society (3.0 cr)</td>
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<td>GEOG 8292</td>
<td>Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)</td>
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<td>GEOG 8293</td>
<td>CyberGIS (3.0 cr)</td>
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<tr>
<td>GEOG 8294</td>
<td>Spatiotemporal Modeling and Simulation (3.0 cr)</td>
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<tr>
<td>GIS 5555</td>
<td>Basic Spatial Analysis (3.0 cr)</td>
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<td>GIS 5571</td>
<td>ArcGIS I (3.0 cr)</td>
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<tr>
<td>GIS 5572</td>
<td>ArcGIS II (3.0 cr)</td>
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<tr>
<td>GIS 5573</td>
<td>Introduction to Digital Mapping: ArcGIS Basics (2.0 cr)</td>
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<tr>
<td>GIS 5574</td>
<td>Web GIS and Services (3.0 cr)</td>
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<tr>
<td>GIS 5576</td>
<td>Spatial Digital Humanities (3.0 cr)</td>
</tr>
<tr>
<td>GIS 5577</td>
<td>Spatial Database Design and Administration (3.0 cr)</td>
</tr>
<tr>
<td>GIS 5578</td>
<td>GIS Programming (3.0 cr)</td>
</tr>
<tr>
<td>PA 5271</td>
<td>Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)</td>
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<td>VMED 5181</td>
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</tbody>
</table>

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Geography M.A.
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: geog-das@umn.edu
Website: http://www.geog.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at the University of Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Three Plan B papers are required. These papers have the quality but not the scope of a master's thesis, and usually are enhanced versions of research papers done in connection with coursework and seminars.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Courses (4 credits)
Take the following courses:
- GEOG 8001 - Problems in Geographic Thought (3.0 cr)
- GEOG 8405 - Seminar: Graduate Student Professional Development (1.0 cr)

Methods Course (4 credits)
Take at least 4 credits of methods coursework, chosen in consultation with the advisor.

Major Electives (6 to 16 credits)
All students select 6 8xxx-level credits, and Plan B students select at least 10 additional credits from the following in consultation with the advisor:
- GEOG 8001 - Problems in Geographic Thought (3.0 cr)
- GEOG 8002 - Research Methods in Geography (3.0 cr)
- GEOG 8005 - Proseminar: Population Geography (3.0 cr)
- GEOG 8006 - Proseminar: Research Methods in Geography (3.0 cr)
- GEOG 8007 - Proseminar: Theories of Development and Change (3.0 cr)
- GEOG 8020 - Research Seminar: Economic Geography (3.0 cr)
- GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
- GEOG 8102 - Proseminar: The State, the Economy, and Spatial Development (3.0 cr)
- GEOG 8103 - Proseminar: Physical Geography (3.0 cr)
- GEOG 8105 - Proseminar: Historical Geography (3.0 cr)
- GEOG 8106 - Seminar: Social and Cultural Geography (3.0 cr)
- GEOG 8107 - Geographic Writing (3.0 cr)
- GEOG 8200 - Seminar: Urban Geography (2.0 - 3.0 cr)
- GEOG 8201 - Explorations in the Geography of Minnesota (3.0 cr)
- GEOG 8211 - Federal Policy Research (3.0 cr)
- GEOG 8212 - Africa (3.0 cr)
- GEOG 8213 - East Asia and China (3.0 cr)
- GEOG 8214 - South Asia (3.0 cr)
- GEOG 8220 - Agrarian Change and Rural Development (3.0 cr)
- GEOG 8230 - Theoretical Geography (3.0 cr)
- GEOG 8240 - Medical Geography (3.0 cr)
- GEOG 8260 - Seminar: Physical Geography (2.0 cr)
- GEOG 8270 - Seminar: Climatology (3.0 cr)
- GEOG 8280 - Biogeography (3.0 cr)
- GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
- GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
- GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
- GEOG 8293 - CyberGIS (3.0 cr)
- GEOG 8294 - Spatiotemporal Modeling and Simulation (3.0 cr)
- GEOG 8301 - Advanced Qualitative Methods (3.0 cr)
- GEOG 8302 - Research Development (3.0 cr)
- GEOG 8336 - Development Theory and the State (3.0 cr)
- GEOG 8350 - Seminar: World Population (3.0 cr)
- GEOG 8420 - Teaching Practicum (1.0 cr)
- GEOG 8800 - Seminar: Development of Geographic Thought (3.0 cr)
- GEOG 8970 - Directed Readings (1.0 - 5.0 cr)
- GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)

Outside Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor approval.
- ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNRM 5362 - Drones: Data, Analysis, and Operations (3.0 cr)
GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
SOC 5811 - Social Statistics for Graduate Students (3.0 cr)

Plan Options

Plan A

Thesis Credits
Take 10 master's thesis credits.
GEOG 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
**Twin Cities Campus**

**Geography Minor**

*Geography, Environment, Society*

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**

Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)

Email: geog-dgs@umn.edu

Website: http://www.geog.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

**Special Application Requirements:**

Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Geography director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

The minor must be developed in consultation with a faculty advisor, who is selected in consultation with the Geography director of graduate studies.

The minimum cumulative GPA is 3.0 for minor field coursework applied to the PhD-level minor.

**Coursework (9 to 12 credits)**

Master's students select 9 credits, and doctoral students select 12 credits from the following in consultation with the Geography director of graduate studies:

- GEOG 5385 - Globalization and Development: Political Economy (4.0 cr)
- GEOG 5393 - [Inactive] (4.0 cr)
- GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
- GEOG 5426 - Climatic Variations (3.0 cr)
- GEOG 5511 - Principles of Cartography (4.0 cr)
- GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
- GEOG 5541 - Principles of Geocomputing (3.0 cr)
- GEOG 5543 - Advanced Geocomputing (3.0 cr)
- GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
- GEOG 5562 - GIS Development Practicum (3.0 cr)
- GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
- GEOG 5588 - Advanced Geovisualization (3.0 cr)
GEOG 5839  \textit{(inactive)} (3.0 cr)
GEOG 5900 - Topics in Geography (3.0 cr)
GEOG 8001 - Problems in Geographic Thought (3.0 cr)
GEOG 8002 - Research Methods in Geography (3.0 cr)
GEOG 8005 - Proseminar: Population Geography (3.0 cr)
GEOG 8006 - Proseminar: Research Methods in Geography (3.0 cr)
GEOG 8007 - Proseminar: Theories of Development and Change (3.0 cr)
GEOG 8020 - Research Seminar: Economic Geography (3.0 cr)
GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
GEOG 8102 - Proseminar: The State, the Economy, and Spatial Development (3.0 cr)
GEOG 8103 - Proseminar: Physical Geography (3.0 cr)
GEOG 8105 - Proseminar: Historical Geography (3.0 cr)
GEOG 8106 - Seminar: Social and Cultural Geography (3.0 cr)
GEOG 8107 - Geographic Writing (3.0 cr)
GEOG 8200 - Seminar: Urban Geography (2.0 - 3.0 cr)
GEOG 8201 - Explorations in the Geography of Minnesota (3.0 cr)
GEOG 8211 - Federal Policy Research (3.0 cr)
GEOG 8212 - Africa (3.0 cr)
GEOG 8214 - South Asia (3.0 cr)
GEOG 8220 - Agrarian Change and Rural Development (3.0 cr)
GEOG 8230 - Theoretical Geography (3.0 cr)
GEOG 8240 - Medical Geography (3.0 cr)
GEOG 8260 - Seminar: Physical Geography (2.0 cr)
GEOG 8270 - Seminar: Climatology (3.0 cr)
GEOG 8280 - Biogeography (3.0 cr)
GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
GEOG 8293 - CyberGIS (3.0 cr)
GEOG 8294 - Spatiotemporal Modeling and Simulation (3.0 cr)
GEOG 8301 - Advanced Qualitative Methods (3.0 cr)
GEOG 8302 - Research Development (3.0 cr)
GEOG 8336 - Development Theory and the State (3.0 cr)
GEOG 8350 - Seminar: World Population (3.0 cr)
GEOG 8405 - Seminar: Graduate Student Professional Development (1.0 cr)
GEOG 8420 - Teaching Practicum (1.0 cr)
GEOG 8800 - Seminar: Development of Geographic Thought (3.0 cr)
GEOG 8970 - Directed Readings (1.0 - 5.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral

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Information current as of November 07, 2022
Twin Cities Campus
Geography Ph.D.
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: geog-das@umn.edu
Website: http://www.geog.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 52
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Graduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
16 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses (4 credits)
Take the following courses, preferably during the first year of study:
GEOG 8001 - Problems in Geographic Thought (3.0 cr)
GEOG 8405 - Seminar: Graduate Student Professional Development (1.0 cr)

Methods Course (3 credits)
Select 3 credits of methods coursework in consultation with the advisor and subject to director of graduate studies approval.

Proposal-writing Course (3 credits)
Take the following course. Other coursework may be applied to this requirement with director of graduate studies approval.
GEOG 8302 - Research Development (3.0 cr)

Major Electives (6 credits)
Select 6 credits from the following, at least 3 credits of which must be from a GEOG 82xx course. Other coursework may be applied to this requirement with advisor approval.
GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
GEOG 8102 - Proseminar: The State, the Economy, and Spatial Development (3.0 cr)
GEOG 8103 - Proseminar: Physical Geography (3.0 cr)
GEOG 8105 - Proseminar: Historical Geography (3.0 cr)
GEOG 8106 - Seminar: Social and Cultural Geography (3.0 cr)
GEOG 8107 - Geographic Writing (3.0 cr)
GEOG 8200 - Seminar: Urban Geography (2.0 - 3.0 cr)
GEOG 8201 - Explorations in the Geography of Minnesota (3.0 cr)
GEOG 8211 - Federal Policy Research (3.0 cr)
GEOG 8212 - Africa (3.0 cr)
GEOG 8213 - East Asia and China (3.0 cr)
GEOG 8214 - South Asia (3.0 cr)
GEOG 8220 - Agrarian Change and Rural Development (3.0 cr)
GEOG 8230 - Theoretical Geography (3.0 cr)
GEOG 8240 - Medical Geography (3.0 cr)
GEOG 8260 - Seminar: Physical Geography (2.0 cr)
GEOG 8270 - Seminar: Climatology (3.0 cr)
GEOG 8280 - Biogeography (3.0 cr)
GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
GEOG 8293 - CyberGIS (3.0 cr)
GEOG 8294 - Spatiotemporal Modeling and Simulation (3.0 cr)
GEOG 8301 - Advanced Qualitative Methods (3.0 cr)
GEOG 8302 - Research Development (3.0 cr)
GEOG 8336 - Development Theory and the State (3.0 cr)
GEOG 8350 - Seminar: World Population (3.0 cr)
GEOG 8405 - Seminar: Graduate Student Professional Development (1.0 cr)
GEOG 8420 - Teaching Practicum (1.0 cr)
GEOG 8800 - Seminar: Development of Geographic Thought (3.0 cr)
GEOG 8970 - Directed Readings (1.0 - 5.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)

Outside Coursework (12 credits)
Select 12 credits in consultation with the advisor.
AMST 8920 - Topics in American Studies (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)
DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
ESCI 5980 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
GIS 5555 - Basic Spatial Analysis (3.0 cr)
GIS 5571 - ArcGIS I (3.0 cr)
GIS 5572 - ArcGIS II (3.0 cr)
GIS 5574 - Web GIS and Services (3.0 cr)
GIS 5577 - Spatial Database Design and Administration (3.0 cr)
GLOS 5900 - Topics in Global Studies (1.0 - 4.0 cr)
GRAD 5105 - Practicum in University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
GRAD 8401 - Dissertation Proposal Development Seminar (3.0 cr)
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
GWSS 8270 - Seminar: Theories of Body (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 5993 - Directed Study (1.0 - 16.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8970 - Advanced Research in Quantitative History (3.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
POL 8990 - Directed Readings and Research in Political Science (1.0 - 7.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

**Thesis Credits**

Take 24 doctoral thesis credits.

GEOG 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Germanic Studies M.A.
German, Nordic, Slavic & Dutch
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Nordic, Slavic & Dutch, 320 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)
Email: gradgsd@umn.edu
Website: http://www.cla.umn.edu/gnsd

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic Studies program in the Department of German, Nordic, Slavic & Dutch (GNSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration.

The Germanic Studies program offers both MA and PhD degrees which are tailored to students individual needs and interdisciplinary interests. Students have the option to pursue a track in German (MA, PhD), Germanic Medieval Studies (MA, PhD) or Scandinavian Studies (MA) by completing a specified number of courses in one of those areas.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
BA or equivalent in German, Scandinavian, or related field. Students are usually admitted to the PhD program, but the MA must be completed first. Applicants must have fluency in German or a Scandinavian language.

Special Application Requirements:
In addition to the University's application requirements, the department requires the following: a copy of one or more papers representative of the applicant's level of scholarly development (not to exceed 25 total pages); three letters of recommendation; the General (Aptitude) Test of the GRE (required for master's program applicants except those whose native language is not English). Students are admitted for fall semester only. All application materials may be uploaded into the online application and must be submitted by December 15.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B paper is usually a seminar paper from a specific course, improved and reworked in consultation with the advisor. For students completing the MA with a track, the Plan B must be focused on that selected track.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of C earned.

Students must demonstrate oral and written proficiency in German or one Scandinavian language.

**Required Core (6 credits)**

Take the following courses:
- GSD 5103 - Teaching of Germanic Languages (3.0 cr)
- GSD 8001 - Approaches to Textual Analysis (3.0 cr)

**Outside Coursework (6 credits)**

Select 6 credits outside the major in consultation with the advisor and the director of graduate studies. Directed Study, Directed Research, and Directed Readings courses may be applied to this requirement with advisor and director of graduate studies approval.

- CSCL 5xxx
- CSCL 8xxx
- CSDS 5xxx
- CSDS 8xxx
- ENGL 5xxx
- ENGL 8xxx
- HIST 5xxx
- HIST 8xxx
- RUSS 5xxx

**Germanic Studies -No Track**

**Electives for Germanic Studies - No Track (0 to 18 credits)**

Students completing one of the tracks are exempt from this Electives requirement. Students completing the MA without a track select 18 credits from the following, in consultation with the advisor and director of graduate studies to complete the 30-credit minimum. GER 5011 cannot be applied to the Electives requirement.

- DTCH 5xxx
- FIN 5xxx
- GER 5xxx
- GER 8xx
- SCAN 5xxx
- SCAN 8xxx

**Program Sub-plans**
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

**German**

**Electives (15 credits)**
Select 15 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.

GER 5xxx
GER 8xxx

**Additional Elective (3 credits)**
Select 3 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.

DTCH 5xxx
FIN 5xxx
GER 5xxx
GER 8xxx
SCAN 5xxx
SCAN 8xxx

**Germanic Medieval Studies**

**Electives (15 credits)**
Select 15 credits from the following in consultation with the advisor and director of graduate studies.

ENGL 4612 - Old English I (3.0 cr)
ENGL 4613 - Old English II (3.0 cr)
GER 5711 - History of the German Language I (3.0 cr)
GER 5721 - Introduction to Middle High German (3.0 cr)
GER 5734 - Old Saxon (3.0 cr)
GER 8200 - Seminar in Medieval German Literature and Culture (3.0 cr)
GER 8210 - Seminar in Early Modern German Literature and Culture (3.0 cr)
SCAN 5502 - The Icelandic Saga (3.0 cr)
SCAN 5701 - Old Norse Language and Literature (3.0 cr)
SCAN 5703 - Old Norse Poetry (3.0 cr)
SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)

**Additional Elective (3 credits)**
Select 3 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.

DTCH 5xxx
FIN 5xxx
GER 5xxx
GER 8xxx
SCAN 5xxx
SCAN 8xxx

**Scandinavian Studies**

**Electives (15 credits)**
Select 15 credits from the following in consultation with the advisor and director of graduate studies.

FIN 5xxx
SCAN 5xxx
SCAN 8xxx

**Additional Elective (3 credits)**
Select 3 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.

DTCH 5xxx
FIN 5xxx
GER 5xxx
GER 8xxx
SCAN 5xxx
SCAN 8xxx
Twin Cities Campus

Germanic Studies Minor

German, Nordic, Slavic & Dutch

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Nordic, Slavic & Dutch, 320 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297).
Email: gradgsd@umn.edu
Website: http://cla.umn.edu/gnsd

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic Studies program in the Department of German, Nordic, Slavic & Dutch (GNSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration. GNSD faculty represent all historical areas of specialization from the medieval to the contemporary periods.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Germanic Studies director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Coursework applied to the minor must be taken on the A-F grade basis, with a minimum grade of C earned for each course.

The minimum cumulative GPA for minor field coursework is 3.00.

Required Course (3 credits)
All students take the following course:
GSD 8001 - Approaches to Textual Analysis (3.0 cr)

Electives (6 to 12 credits)
Masters students select at least 6 credits, and doctoral students select at least 12 credits from the following in consultation with the Germanic Studies director of graduate studies. GER 5011 cannot be applied toward the minors credit requirements.

DTCH 5xxx
FIN 5xxx
GER 5xxx
GER 8xxx
SCAN 5xxx
SCAN 8xxx

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Germanic Studies Ph.D.
German, Nordic, Slavic & Dutch
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Nordic, Slavic & Dutch, 320 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)
Email: gradgnsd@umn.edu
Website: http://www.cla.umn.edu/gnsd

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 60
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic studies program in the Department of German, Nordic, Slavic & Dutch (GNSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration.

The Germanic studies program offers both MA and PhD degrees and allows students to tailor their programs to their individual needs and interdisciplinary interests. Students have the option to pursue a track in German (MA, PhD), Germanic Medieval studies (MA, PhD), or Scandinavian studies (MA) by completing a specified number of courses in one of those areas.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

MA or equivalent from another institution in German or a related field.

Other requirements to be completed before admission:
Students with a BA only are usually admitted to the PhD program, but the MA must be completed first.

Applicants must have fluency in German.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See requirements listed below.

A minimum GPA of 3.00 is required for students to remain in good standing.

All courses graded on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of C for each.

Reading competence in two languages or a high degree of proficiency in one language other than English or German.

Two semesters of teaching experience are required.

Required Core (9 credits)
Take the following courses:
GSD 5103 - Teaching of Germanic Languages (3.0 cr)
GSD 8001 - Approaches to Textual Analysis (3.0 cr)
GSD 8801 - Dissertation Seminar (3.0 cr)

Outside Coursework (12 credits)
Select 12 credits outside the major in consultation with the advisor and director of graduate studies. Directed Study, Directed Research, and Directed Readings courses may be applied to this requirement with advisor and director of graduate studies approval.
Up to 2 courses from the MA may be applied to this requirement.
CSCL 5xxx
CSCL 8xxx
CSDS 5xxx
CSDS 8xxx
ENGL 5xxx
ENGL 8xxx
HIST 5xxx
HIST 8xxx
RUSS 5xxx

Thesis Credits
Take 24 doctoral thesis credits.
GSD 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Germanic Studies - No Emphasis

Electives (0 to 15 credits)
Students completing one of the tracks are exempt from this Electives requirement.
Students completing the PhD without a track select 15 credits from the following, in consultation with the advisor and director of graduate studies, to complete the minimum credit requirements. GER 5011 cannot be applied to the Electives requirement.
DTCH 5xxx
FIN 5xxx
GER 5xxx
GER 8xxx
SCAN 5xxx
SCAN 8xxx

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

**German**

**Electives (12 credits)**
Select 12 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.
- GER 5xxx
- GER 8xxx

**Additional Elective (3 credits)**
Select 3 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.
- DTCH 5xxx
- FIN 5xxx
- GER 5xxx
- GER 8xxx
- SCAN 5xxx
- SCAN 8xxx

**Germanic Medieval Studies**

**Electives (12 credits)**
Select 12 credits from the following in consultation with the advisor and director of graduate studies:
- ENGL 4612 - Old English I (3.0 cr)
- ENGL 4613 - Old English II (3.0 cr)
- GER 5711 - History of the German Language I (3.0 cr)
- GER 5721 - Introduction to Middle High German (3.0 cr)
- GER 5734 - Old Saxon (3.0 cr)
- GER 8200 - Seminar in Medieval German Literature and Culture (3.0 cr)
- GER 8210 - Seminar in Early Modern German Literature and Culture (3.0 cr)
- SCAN 5502 - The Icelandic Saga (3.0 cr)
- SCAN 5701 - Old Norse Language and Literature (3.0 cr)
- SCAN 5703 - Old Norse Poetry (3.0 cr)
- SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)

**Additional Elective (3 credits)**
Select 3 credits from the following in consultation with the advisor and director of graduate studies. GER 5011 cannot be applied to this requirement.
- DTCH 5xxx
- FIN 5xxx
- GER 5xxx
- GER 8xxx
- SCAN 5xxx
- SCAN 8xxx
Twin Cities Campus
Health Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
111 Murphy Hall
206 Church Street
Minneapolis, MN 55455
612/625-0120
Email: sjmcho@umn.edu
Website: https://hsjmc.umn.edu/graduate/degree-programs/ma-health-communication

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Health Communication MA prepares students for healthcare careers that rely on the strategic use of health information to communicate with patient and nonpatient publics, care providers, administrators and other public health stakeholders. The program is designed around a curriculum of academic and professional skills courses from strategic communication, public health, and other relevant disciplines.

Admissions to this program currently are not being accepted.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Students must be enrolled in the BA in journalism/strategic communication track to apply for Integrated BA journalism/MA health communication sub-plan admission. Admission is considered for summer term only; the application deadline is February 15.

Special Application Requirements:
Applicants must submit a department application; a statement of objectives articulating interest and readiness for the program; a complete set of transcripts; an academic and professional work sample; a resume or curriculum vita; and scores from the General Test of the GRE.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 155
  - General Test - Analytical Writing: 4.5

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: JOUR 8193, Health Communication Capstone, allows you to focus on different aspects of health communication relevant to your interests. Students will prepare a final project: a publishable article, a multimedia projection, an original research paper or other options aimed at a particular audience. This project is completed during the second semester of the MA program.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 0 semesters must be completed before filing a Degree Program Form.

Core Courses
- JOUR 5541 - Mass Communication and Public Health (3.0 cr)
- JOUR 5542 - Theory-based Health Message Design (3.0 cr)
- JOUR 5543 - Programs for Social Good: Design and Evaluation (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

Electives
Take 12 or more credit(s) from the following:
- JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
- JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
- JOUR 8720 - Health Communication Theory and Research (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
- WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)
- WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)

Capstone
- JOUR 8193 - Health Communication Capstone (3.0 cr)

Practicum
- JOUR 8194 - Health Communication Practicum (3.0 cr)
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics M.A.
Spanish & Portuguese Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street SE, Minneapolis, Minnesota, 55455 (612-625-5858; fax: 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only to the PhD program.

The Hispanic and Lusophone Literatures, Cultures, and Linguistics MA program provides students with a focused and rigorous formation in the literatures, languages, and cultures of Spain, Latin America, and the Portuguese speaking world. Students choose one of three areas of emphasis: Hispanic Literatures & Cultures, Lusophone Literatures & Cultures, or Hispanic Linguistics

The Hispanic Literatures and Cultures track provides solid intellectual and professional preparation in Iberian and Latin American literatures and cultures. Works and intellectual movements are studied in their historical, social, and cultural contexts, combining the approaches of literary and cultural criticism with those of intellectual history, sociology, gender and sexuality studies, among others.

The Linguistics track is centered on the relation between language and its context of use, encompassing social, pragmatic, and discourse factors. It provides students with a strong background in the following areas of Hispanic linguistics: phonetics, phonology, syntax, pragmatics and discourse, historical linguistics, language variation, and second language acquisition.

The Lusophone Literatures & Cultures track prepares students in Portuguese studies, understood as an interdisciplinary critical formation through which the cultures and literatures of Portugal, Brazil, and Lusophone Africa are approached. Students are trained in the main historical periods, cultural movements, and social issues pertaining to the Portuguese-speaking world, both nationally and transnationally, within relevant comparative frameworks.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Required: Fluency in Spanish or Portuguese
Preferred: Undergraduate degree or substantial coursework in the fields of Hispanic literatures and cultures, Lusophone literatures and cultures, or Hispanic linguistics

Special Application Requirements:
The application deadline is December 15 for the following fall semester. Application materials include:
- research statement;
- writing sample representing level of scholarly development;
- three letters of recommendation;
- a 5-minute voice sample;
- a curriculum vitae;
- TOEFL, MELAB, or IELTS scores; and
transcripts. For more information, refer to http://spanport.umn.edu/grad/applying.html

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Part 1 (Composition) score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

**Plan B:** Plan B requires 30 major credits and 6 credits outside the major. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

Students must have reading knowledge of a foreign language outside of their principal area of study. With advisor approval, students may take one 5xxx-level course outside the department S/N; one course within the department outside the area of study S/N; and language courses S/N.

### Required Courses (6 Credits)

Take the following courses:

- **SPPT 5995** - Directed Teaching (1.0 cr)
- **SPPT 5999** - The Teaching of College-Level Spanish: Theory and Practice (3.0 cr)
- **SPPT 8920** - Introduction to Hispanic and Lusophone Literatures, Cultures, and Languages (2.0 cr)

### Outside Coursework (6 Credits)

Select at least 6 credits of outside coursework in consultation with the advisor. Directed study, directed readings, and topics courses must be approved by the advisor.

- **ADDS 5081** - Multicultural Foundations of Behavioral Health (3.0 cr)
- **AFRO 5101** - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- **AFRO 5910** - Topics in African American and African Studies (3.0 cr)
- **AFRO 5993** - Directed Study (1.0 - 3.0 cr)
- **AFRO 8005** - Linguistic Anthropology (3.0 cr)
- **ANTH 8005** - Linguistic Anthropology (3.0 cr)
- **ARAB 5040** - Readings in Arabic Texts (2.0 - 4.0 cr)
- **ARAB 5993** - Directed Studies (1.0 - 5.0 cr)
- **CHIC 5920** - Topics in Chicana(o) Studies (3.0 cr)
- **CI 5608** - CARLA Summer Institute Seminar (1.0 - 4.0 cr)
- **CI 5628** - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
- **CI 5670** - Foundations of Dual Language and Immersion Education (3.0 cr)
- **CI 8153** - Research Approaches to Classroom Discourse (3.0 cr)
- **CI 8671** - Sociolinguistic Research Approaches to Education (3.0 cr)
- **CI 8689** - Language and Education Policy (3.0 cr)
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<th>Course Code</th>
<th>Course Title</th>
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<td>Problems: Second Languages and Cultures Education (1.0 - 6.0 cr)</td>
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<td>CNRC 5071</td>
<td>Greek and Hellenistic Religions (3.0 cr)</td>
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<td>CNRC 8513</td>
<td>Scripture and Interpretation (3.0 cr)</td>
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<td>Readings in Religious Texts (3.0 cr)</td>
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<td>COMM 5211</td>
<td>Critical Media Studies: Theory and Methods (3.0 cr)</td>
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<td>CSCL 5303</td>
<td>Sound Studies (3.0 cr)</td>
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<td>CSCL 5833</td>
<td>Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)</td>
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<td>Directed Study (1.0 - 3.0 cr)</td>
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<td>CSCL 8910</td>
<td>Advanced Topics in Comparative Literature (3.0 - 4.0 cr)</td>
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<td>DSSC 8111</td>
<td>Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)</td>
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<td>DSSC 8112</td>
<td>Scholarship and Public Responsibility (1.0 cr)</td>
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<td>DSSC 8211</td>
<td>Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)</td>
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<td>EMS 8100</td>
<td>Workshop in Early Modern Studies (1.0 - 3.0 cr)</td>
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<td>Seminar in Early Modern Studies (3.0 cr)</td>
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<td>ENGL 5510</td>
<td>Readings in Literature and Culture (3.0 cr)</td>
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<td>ENGL 5570</td>
<td>Readings in Early Modern Literature and Culture (3.0 cr)</td>
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<td>Readings in 18th Century Literature and Culture (3.0 cr)</td>
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<td>ENGL 5605</td>
<td>Writing for Publication (3.0 cr)</td>
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<td>ENGL 8090</td>
<td>Seminar in Special Subjects (3.0 cr)</td>
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<td>ENGL 8170</td>
<td>Seminar in 19th-Century British Literature and Culture (3.0 cr)</td>
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<td>EPSY 5261</td>
<td>Introductory Statistical Methods (3.0 cr)</td>
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<td>EPSY 5262</td>
<td>Intermediate Statistical Methods (3.0 cr)</td>
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<td>FREN 8110</td>
<td>Topics in Early Medieval French Literature (3.0 cr)</td>
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<td>FREN 8190</td>
<td>Old French Workshop (1.0 cr)</td>
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<td>FREN 8230</td>
<td>Critical Issues: Criticism and Thought (3.0 cr)</td>
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<td>FREN 8340</td>
<td>Critical Issues: French and Francophone Cinema (3.0 cr)</td>
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<td>FREN 8420</td>
<td>Critical Issues: Francophone Literature (3.0 cr)</td>
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<td>FREN 8992</td>
<td>Directed Readings for Graduate Students (1.0 - 5.0 cr)</td>
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<td>GEOG 8230</td>
<td>Theoretical Geography (3.0 cr)</td>
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<td>GIS 5573</td>
<td>Introduction to Digital Mapping: ArcGIS Basics (2.0 cr)</td>
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<td>GLOS 5993</td>
<td>Directed Studies (1.0 - 4.0 cr)</td>
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<td>GRAD 5102</td>
<td>Preparation for University Teaching for Nonnative English Speakers (2.0 cr)</td>
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<td>GRAD 5105</td>
<td>Practicum in University Teaching for Nonnative English Speakers (2.0 cr)</td>
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<td>GRAD 8101</td>
<td>Teaching in Higher Education (3.0 cr)</td>
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<td>GRAD 8120</td>
<td>Teaching and Learning Topics in Higher Education (1.0 cr)</td>
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<td>GWSS 5104</td>
<td>Transnational Feminist Theory (3.0 cr)</td>
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<td>GWSS 5190</td>
<td>Topics: Theory, Knowledge, and Power (3.0 cr)</td>
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<td>GWSS 8109</td>
<td>Feminist Knowledge Production (3.0 cr)</td>
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<td>GWSS 8220</td>
<td>Seminar: Science, Technology &amp; Environmental Justice (3.0 cr)</td>
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<td>GWSS 8230</td>
<td>Seminar: Cultural Criticism and Media Studies (3.0 cr)</td>
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<td>GWSS 8490</td>
<td>Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)</td>
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<td>GWSS 8993</td>
<td>Directed Study (1.0 - 6.0 cr)</td>
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<td>GWSS 8996</td>
<td>Feminist Studies Colloquium (1.0 cr)</td>
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<td>HIST 5711</td>
<td>Cognitive History (3.0 cr)</td>
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<td>HIST 5890</td>
<td>Readings in American Indian and Indigenous History (3.0 cr)</td>
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<td>HIST 5901</td>
<td>Latin America Proseminar: Colonial (3.0 cr)</td>
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<td>HIST 5910</td>
<td>Topics in U.S. History (1.0 - 4.0 cr)</td>
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<td>HIST 5932</td>
<td>The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)</td>
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<td>HIST 8025</td>
<td>Politics of Historical Memory (3.0 cr)</td>
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<td>HIST 8900</td>
<td>Topics in European/Medieval History (1.0 - 4.0 cr)</td>
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<td>Topics in History (1.0 - 4.0 cr)</td>
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<td>HIST 8993</td>
<td>Directed Study (1.0 - 16.0 cr)</td>
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<td>HSCI 5611</td>
<td>Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)</td>
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<td>ITAL 5289</td>
<td>The Narrow Door: Women Writers and Feminist Practices in Italian Literature and Culture (4.0 cr)</td>
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<td>ITAL 5502</td>
<td>Making of Modern Italy: From the Enlightenment to the Present (3.0 cr)</td>
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<td>ITAL 5970</td>
<td>Directed Readings (1.0 - 4.0 cr)</td>
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<td>LAT 5003</td>
<td>Intermediate Latin Prose for Graduate Student Research (4.0 cr)</td>
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<td>LAT 5004</td>
<td>Intermediate Latin Poetry for Graduate Research (4.0 cr)</td>
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<td>LING 5201</td>
<td>Syntactic Theory I (3.0 cr)</td>
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<td>Syntactic Theory II (3.0 cr)</td>
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<td>LING 5302</td>
<td>Phonological Theory I (3.0 cr)</td>
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<td>Phonological Theory II (3.0 cr)</td>
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<td>LING 5461</td>
<td>Conversation Analysis (3.0 cr)</td>
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LING 5601 - Historical Linguistics (3.0 cr)
LING 5900 - Topics in Linguistics (3.0 cr)
MIMS 5910 - Topics in Moving Image Studies (2.0 - 4.0 cr)
MIMS 8001 - Theories of the Moving Image (3.0 cr)
MIMS 8003 - Historiography of the Moving Image (3.0 cr)
MUS 5993 - Directed Studies (1.0 - 4.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
PHIL 5760 - Selected Topics in Philosophy (3.0 cr)
PHIL 8510 - Seminar: Aesthetics Studies (3.0 cr)
PHIL 8660 - Seminar: Social and Cultural Studies of Science (3.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
SCMC 5002 - Advanced Film Analysis (4.0 cr)
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Hispanic Literatures and Cultures
This sub-plan is limited to students completing the program under Plan B.

Spanish Peninsular and/or Spanish American Literatures and Cultures (24 Credits)
Select at least 24 credits from the following in consultation with the advisor:
SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
SPAN 5180 - Don Quixote (3.0 cr)
SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)
SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)
SPAN 5920 - Topics in Spanish-American Studies (3.0 cr)
SPPT 5930 - Selected Topics in Hispanic and Lusophone Cultural Discourse (1.0 - 3.0 cr)

Hispanic Linguistics
This sub-plan is limited to students completing the program under Plan B.

Required Courses (24 Credits)
Phonology (6 credits)
Select at least 6 credits from the following in consultation with the advisor:
LING 5302 - Phonological Theory I (3.0 cr)
SPAN 5721 - Spanish Laboratory Phonology (3.0 cr)
Syntax/Pragmatics (6 credits)
Select at least 6 credits from the following in consultation with the advisor:
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5206 - Linguistic Pragmatics (3.0 cr)
SPAN 5714 - Theoretical Foundations of Spanish Syntax (3.0 cr)
SPAN 5716 - Structure of Modern Spanish: Pragmatics (3.0 cr)
Electives (12 Credits)
Select at least 12 credits from the following in consultation with the advisor:
SPAN 5701 - History of Ibero-Romance (3.0 cr)
SPAN 5717 - Spanish Sociolinguistics (3.0 cr)
SPAN 5718 - Spanish Language Contact (3.0 cr)
SPAN 5930 - Topics in Ibero-Romance Linguistics (3.0 cr)
SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)
SPAN 5991 - The Acquisition of Spanish as a First and Second Language (3.0 cr)
The following courses, if not used to satisfy a required category, may be used as an Elective.
SPAN 5711, 5714, 5716, 5721
Lusophone Literatures and Cultures
This sub-plan is limited to students completing the program under Plan B.

Required Courses (24 Credits)
Lusophone Literatures & Cultures (12 credits)
Select at least 12 credits from the following in consultation with the advisor:
PORT 5xxx

Spanish Peninsular or Spanish-American Literatures & Cultures (12 credits)
Select at least 12 credits from the following in consultation with the advisor:
SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
SPAN 5180 - Don Quixote (3.0 cr)
SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)
SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)
SPAN 5920 - Topics in Spanish-American Studies (3.0 cr)
SPPT 5930 - Selected Topics in Hispanic and Lusophone Cultural Discourse (1.0 - 3.0 cr)
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics Minor
Spanish & Portuguese Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street SE, Minneapolis, Minnesota, 55455 (612-625-5858; fax: 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Hispanic and Lusophone Literatures, Cultures, and Linguistics minor allows students in related fields to pursue research with graduate faculty in the department. Faculty have specialties in a variety of fields such as cultural studies, linguistics, political science, law, and textual analysis, and research contacts and visibility in Latin America and Europe.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Hispanic and Lusophone Literatures, Cultures, and Linguistics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor field coursework is determined in consultation with the Hispanic and Lusophone Literatures, Cultures, and Linguistics director of Graduate Studies.

Minor field coursework that is offered on both the A-F and S/N grade basis must be taken A/F, with a minimum grade of B earned for each course.

The minimum cumulative GPA for minor field coursework is 3.5.

Coursework (6 to 12 credits)
Master's students select 6 credits and doctoral students select 12 credits from the following in consultation with the HLLCL director of graduate studies.
SPAN 5xxx
SPAN 8xxx
PORT 5xxx
PORT 8xxx
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics Ph.D.
Spanish & Portuguese Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN, 55455 (612-625-5858; fax 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 79 to 82
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Hispanic and Lusophone Literatures, Cultures, and Linguistics PhD program provides students with a focused and rigorous formation in the literatures, languages, and cultures of Spain, Latin America, and the Portuguese speaking world. Students choose one of three areas of emphasis: Hispanic Literatures & Cultures, Lusophone Literatures & Cultures, or Hispanic Linguistics. In addition to establishing a specialization in one or more areas of Hispanic or Lusophone studies, the program allows and encourages students to pursue comparative or interdisciplinary work. Students complement their work in the department with coursework in other disciplines such as: Gender, Women, and Sexuality Studies; Medieval Studies; Linguistics; Curriculum and Instruction; History; Cultural Studies and Comparative Literature; African-American and African Studies; Human Rights Program; Geography; Sociology; and Moving Image Studies.

The department faculty is committed to preparing students and giving them the tools to become scholars and teachers of the highest quality. The department has a strong tradition of fostering socio-historical perspectives on literatures, languages, and cultures. The graduate Literature & Cultures faculty is committed to comparative and interdisciplinary research and engages a variety of contemporary theoretical approaches, with strengths in postcolonial theory, social justice and human rights, memory studies, critical race theory, diasporic studies, and gender and sexuality studies. Members of the Hispanic Linguistics faculty are specialists in the fields of sociolinguistics, second language acquisition, syntax, pragmatics, and phonology.

The department offers students in the program faculty mentoring, a seminar, and workshops on professional development, including publishing, teaching, and interviewing. In addition, graduate student workshops in both literatures and cultures and in linguistics foster student-faculty relations and allow graduate students to ready themselves for conference participation. Travel funds are available through the department to allow students to present their papers at conferences in the United States or abroad.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must first apply to, or hold, a master of arts degree (or its equivalent) before applying to the PhD program. A graduate GPA of 3.50 is preferred.

Other requirements to be completed before admission:
Prospective students generally have completed an undergraduate degree or substantial coursework in the fields of Hispanic literatures and cultures, Lusophone literatures and cultures, or Hispanic linguistics, although individuals with other backgrounds may be admitted.

The Graduate Studies Committee may require students admitted without sufficient preparation to take additional coursework beyond the PhD credit requirements.

Special Application Requirements:
Students admitted to the program are required to be fluent in Spanish or Portuguese.
The application deadline is December 15 for the following fall semester. Application materials include:

- University of Minnesota application & fee;
- Transcripts;
- TOEFL test scores;
- Letters of recommendation x3;
- Research statement;
- Diversity statement (optional);
- Resume/CV;
- Writing sample;
- Extenuating circumstances (optional);
- Five minute voice sample.

For more information, refer to “How to Apply” at https://cla.umn.edu/spanish-portuguese/graduate/how-apply-0.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

43 to 46 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Fluency in Spanish and/or Portuguese

A minimum GPA of 3.50 is required for students to remain in good standing.

Students entering the program with an MA from other institutions must take a minimum of 7 graduate courses (21 credits) in this department.

Students are expected to enroll for at least 9 credits each semester from the term of matriculation through degree completion.

A limited number of courses can be repeated to meet degree requirements. Pre-approval by the advisor and director of graduate studies is required.

**Required Coursework (7 credits)**

Take the following courses:

- **SPPT 5999** - The Teaching of College-Level Spanish: Theory and Practice (3.0 cr)
- **SPPT 5995** - Directed Teaching (1.0 cr)
- **SPPT 8920** - Introduction to Hispanic and Lusophone Literatures, Cultures, and Languages (2.0 cr)
- **SPPT 8930** - Dissertation & Professionalization Workshop (1.0 cr)

**Outside Coursework (12 credits)**

Take 12 credits, selected in consultation with the advisor, from outside the major.

- **ADDS 5081** - Multicultural Foundations of Behavioral Health (3.0 cr)
- **AFRO 5101** - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- **AFRO 5910** - Topics in African American and African Studies (3.0 cr)
- **AFRO 5993** - Directed Study (1.0 - 3.0 cr)
- **AFRO 8202** - Seminar: Intellectual History of Race (3.0 cr)
- **AFRO 8910** - Topics in Studies of Africa and the African Diaspora (3.0 cr)
- **AMES 5920** - Topics in Asian Culture (3.0 cr)
- **AMES 8001** - Critical Approaches to Asian and Middle Eastern Studies (3.0 cr)
- **ANTH 8005** - Linguistic Anthropology (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
<td>ARAB 5040</td>
<td>Readings in Arabic Texts (2.0 - 4.0 cr)</td>
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<td>ARAB 5993</td>
<td>Directed Studies (1.0 - 5.0 cr)</td>
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<td>CHIC 5920</td>
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<td>CI 5670</td>
<td>Foundations of Dual Language and Immersion Education (3.0 cr)</td>
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<td>CI 8153</td>
<td>Research Approaches to Classroom Discourse (3.0 cr)</td>
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<td>CI 8416</td>
<td>Speculative Fiction, Radical Imagination, and Social Change (3.0 cr)</td>
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<td>CI 8671</td>
<td>Sociolinguistic Research Approaches to Education (3.0 cr)</td>
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<td>CI 8689</td>
<td>Language and Education Policy (3.0 cr)</td>
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<td>CI 8695</td>
<td>Problems: Second Languages and Cultures Education (1.0 - 6.0 cr)</td>
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<td>CNRC 5071</td>
<td>Greek and Hellenistic Religions (3.0 cr)</td>
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<td>CNRC 8513</td>
<td>Scripture and Interpretation (3.0 cr)</td>
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<td>CNRC 8570</td>
<td>Readings in Religious Texts (3.0 cr)</td>
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<td>COMM 5211</td>
<td>Critical Media Studies: Theory and Methods (3.0 cr)</td>
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<td>CSCL 5303</td>
<td>Sound Studies (3.0 cr)</td>
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<td>CSCL 5833</td>
<td>Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)</td>
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<td>CSCL 5993</td>
<td>Directed Study (1.0 - 3.0 cr)</td>
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<tr>
<td>CSCL 8910</td>
<td>Advanced Topics in Comparative Literature (3.0 - 4.0 cr)</td>
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<td>Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)</td>
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<td>DSSC 8112</td>
<td>Scholarship and Public Responsibility (1.0 cr)</td>
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<tr>
<td>DSSC 8211</td>
<td>Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)</td>
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<td>DSSC 8310</td>
<td>Topics in Development Studies and Social Change (1.0 - 3.0 cr)</td>
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<tr>
<td>EMS 8100</td>
<td>Workshop in Early Modern Studies (1.0 - 3.0 cr)</td>
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<tr>
<td>EMS 8250</td>
<td>Seminar in Early Modern Studies (3.0 cr)</td>
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<td>ENGL 5121</td>
<td>Readings in Early Modern Literature and Culture (3.0 cr)</td>
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<td>ENGL 5140</td>
<td>Readings in 18th Century Literature and Culture (3.0 cr)</td>
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<td>ENGL 5510</td>
<td>Readings in Criticism and Theory (3.0 cr)</td>
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<td>ENGL 5805</td>
<td>Writing for Publication (3.0 cr)</td>
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<td>ENGL 8090</td>
<td>Seminar in Special Subjects (3.0 cr)</td>
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<td>ENGL 8170</td>
<td>Seminar in 19th-Century British Literature and Culture (3.0 cr)</td>
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<td>EPSY 5261</td>
<td>Introductory Statistical Methods (3.0 cr)</td>
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<td>FREN 5590</td>
<td>Topics in Literature and Culture (3.0 cr)</td>
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<td>FREN 8110</td>
<td>Topics in Early Medieval French Literature (3.0 cr)</td>
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<td>FREN 8190</td>
<td>Old French Workshop (1.0 cr)</td>
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<td>FREN 8230</td>
<td>Critical Issues: Criticism and Thought (3.0 cr)</td>
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<td>FREN 8240</td>
<td>Critical Issues: French and Francophone Cinema (3.0 cr)</td>
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<td>FREN 8420</td>
<td>Critical Issues: Francophone Literature (3.0 cr)</td>
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<td>FREN 8892</td>
<td>Directed Readings for Graduate Students (1.0 - 5.0 cr)</td>
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<td>GEOG 8230</td>
<td>Theoretical Geography (3.0 cr)</td>
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<td>GIS 5573</td>
<td>Introduction to Digital Mapping: ArcGIS Basics (2.0 cr)</td>
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<td>GLOS 5993</td>
<td>Directed Studies (1.0 - 4.0 cr)</td>
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<td>GRAD 5102</td>
<td>Preparation for University Teaching for Nonnative English Speakers (2.0 cr)</td>
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<td>GRAD 8101</td>
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<td>GWSS 5104</td>
<td>Transnational Feminist Theory (3.0 cr)</td>
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<td>GWSS 5190</td>
<td>Topics: Theory, Knowledge, and Power (3.0 cr)</td>
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<td>GWSS 8109</td>
<td>Feminist Knowledge Production (3.0 cr)</td>
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<td>GWSS 8220</td>
<td>Seminar: Science, Technology &amp; Environmental Justice (3.0 cr)</td>
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<tr>
<td>GWSS 8230</td>
<td>Seminar: Cultural Criticism and Media Studies (3.0 cr)</td>
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<tr>
<td>GWSS 8490</td>
<td>Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)</td>
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<td>GWSS 8893</td>
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<td>GWSS 8896</td>
<td>Feminist Studies Colloquium (1.0 cr)</td>
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<td>HIST 5711</td>
<td>Cognitive History (3.0 cr)</td>
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<td>HIST 5890</td>
<td>Readings in American Indian and Indigenous History (3.0 cr)</td>
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<td>HIST 5901</td>
<td>Latin America Proseminar: Colonial (3.0 cr)</td>
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<tr>
<td>HIST 5910</td>
<td>Topics in U.S. History (1.0 - 4.0 cr)</td>
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<tr>
<td>HIST 5932</td>
<td>The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)</td>
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<td>HIST 5993</td>
<td>Directed Study (1.0 - 16.0 cr)</td>
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<tr>
<td>HIST 8025</td>
<td>Politics of Historical Memory (3.0 cr)</td>
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<td>HIST 8900</td>
<td>Topics in European/Medieval History (1.0 - 4.0 cr)</td>
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<td>HIST 8960</td>
<td>Topics in History (1.0 - 4.0 cr)</td>
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<td>HIST 8993</td>
<td>Directed Study (1.0 - 16.0 cr)</td>
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HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
ITAL 5289 - The Narrow Door: Women Writers and Feminist Practices in Italian Literature and Culture (4.0 cr)
ITAL 5502 - Making of Modern Italy: From the Enlightenment to the Present (3.0 cr)
ITAL 5970 - Directed Readings (1.0 - 4.0 cr)
LAT 5003 - Intermediate Latin Prose for Graduate Student Research (4.0 cr)
LAT 5004 - Intermediate Latin Poetry for Graduate Research (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5202 - Syntactic Theory II (3.0 cr)
LING 5302 - Phonological Theory I (3.0 cr)
LING 5303 - Phonological Theory II (3.0 cr)
LING 5461 - Conversation Analysis (3.0 cr)
LING 5601 - Historical Linguistics (3.0 cr)
LING 5900 - Topics in Linguistics (3.0 cr)
MIMS 5910 - Topics in Moving Image Studies (2.0 - 4.0 cr)
MIMS 8001 - Theories of the Moving Image (3.0 cr)
MIMS 8003 - Historiography of the Moving Image (3.0 cr)
MUS 5993 - Directed Studies (1.0 - 4.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
PHIL 5760 - Selected Topics in Philosophy (3.0 cr)
PHIL 8510 - Seminar: Aesthetics Studies (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
SCMC 5002 - Advanced Film Analysis (4.0 cr)
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
SPAN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Emphasis Options

Hispanic Literatures & Cultures (36 credits)

Spanish Peninsular Literature Electives (12 credits)
- Select 12 credits from the following in consultation with the advisor:
  SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
  SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
  SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
  SPAN 5180 - Don Quixote (3.0 cr)
  SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)

Spanish American Literature (12 credits)
- Select 12 credits from the following in consultation with the advisor:
  SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
  SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
  SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
  SPAN 5580 - Latin American Cultural Integration in the Nineteenth Century (3.0 cr)
  SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)

Lusophone Literatures & Cultures (3 credits)
Take SPPT 5930 for a total of 3 credits.
SPPT 5930 - Selected Topics in Hispanic and Lusophone Cultural Discourse (1.0 - 3.0 cr)

Electives (9 credits)
Select 9 credits in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
SPAN 5920 - Topics in Spanish-American Studies (3.0 cr)
SPAN 5930 - Topics in Ibero-Romance Linguistics (3.0 cr)
SPAN 8100 - Research in Sociohistorical Approaches to Spanish Literature (3.0 cr)
SPAN 8200 - Spanish Literary Texts: Theories of Formal Structures (3.0 cr)
SPAN 8212 - Spanish Theater of the 16th Century: Drama up to Lope (3.0 cr)
SPAN 8223 - The Poetry of the Spanish Golden Age (3.0 cr)
SPAN 8230 - The Construction of Spanish Literary History (3.0 cr)
SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
SPAN 8960 - Workshop: Research in Hispanic Cultural Issues (3.0 cr)
SPAN 8990 - Advanced Comparative Research of Caribbean Genres (3.0 cr)

The following courses, if not used to satisfy a required category, may be used as an elective:
SPAN 5110, 5150, 5160, 5170, 5180, 5190; SPAN 5550, 5560, 5570, 5580, 5590

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Information current as of November 07, 2022
Lusophone Literatures & Cultures (36 credits)
Lusophone Literatures & Cultures (12 credits)
Select 12 credits from the following in consultation with the advisor:
- SPPT 5930 - Selected Topics in Hispanic and Lusophone Cultural Discourse (1.0 - 3.0 cr)
- PORT 5xxx

Spanish Peninsular and Spanish-American Literatures & Cultures (12 credits)
Select 12 credits in consultation with the advisor. One 3-credit course not included in the following list can be applied to this requirement with advisor and director of graduate studies approval.
- SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
- SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
- SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
- SPAN 5180 - Don Quixote (3.0 cr)
- SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)
- SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
- SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
- SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
- SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
- SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)
- SPAN 5993 - Directed Studies (1.0 - 4.0 cr)

Electives (12 credits)
Select 12 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
- SPAN 5920 - Topics in Spanish-American Studies (3.0 cr)
- SPAN 8100 - Research in Sociohistorical Approaches to Spanish Literature (3.0 cr)
- SPAN 8200 - Spanish Literary Texts: Theories of Formal Structures (3.0 cr)
- SPAN 8212 - Spanish Theater of the 16th Century: Drama up to Lope (3.0 cr)
- SPAN 8223 - The Poetry of the Spanish Golden Age (3.0 cr)
- SPAN 8300 - The Construction of Spanish Literary History (3.0 cr)
- SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
- SPAN 8960 - Workshop: Research in Hispanic Cultural Issues (3.0 cr)
- SPAN 8990 - Advanced Comparative Research of Caribbean Genres (3.0 cr)

The following courses, if not used to satisfy a required category, may be used as an Elective:
- SPAN 5110, 5150, 5160, 5170, 5180, 5190, 5550, 5560, 5570, 5580, 5993; SPPT 5930; PORT 5520, 5530, 5540, 5910

Hispanic Linguistics (39 credits)
Linguistic Core Areas (30 credits)
Select 3 credits from each of the 5 core areas for a total of 15 credits. To complete the 30-credit requirement, choose an additional 15 credits from the following. Select coursework in consultation with the advisor.

Phonology
Select at least one of the following in consultation with the advisor:
- SPAN 5721 - Spanish Laboratory Phonology (3.0 cr)

Syntax/Pragmatics
Select at least one of the following in consultation with the advisor:
- SPAN 5714 - Theoretical Foundations of Spanish Syntax (3.0 cr)
- SPAN 5716 - Structure of Modern Spanish: Pragmatics (3.0 cr)

Language Variation
Select at least one of the following in consultation with the advisor:
- SPAN 5717 - Spanish Sociolinguistics (3.0 cr)
- SPAN 5718 - Spanish Language Contact (3.0 cr)
- SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)

History of Language
Select at least one of the following in consultation with the advisor:
- SPAN 5701 - History of Ibero-Romance (3.0 cr)

Second Language Acquisition
Select at least one of the following in consultation with the advisor:
- SPAN 5991 - The Acquisition of Spanish as a First and Second Language (3.0 cr)

Electives (9 credits)
Select 9 elective credits from the following in consultation with the advisor. Other courses can be chosen with advisor approval.
- ANTH 8005 - Linguistic Anthropology (3.0 cr)
- CI 5608 - CARLA Summer Institute Seminar (1.0 - 4.0 cr)
- CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
CI 8416 - Speculative Fiction, Radical Imagination, and Social Change (3.0 cr)
CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
CI 8689 - Language and Education Policy (3.0 cr)
CI 8695 - Problems: Second Languages and Cultures Education (1.0 - 6.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5202 - Syntactic Theory II (3.0 cr)
LING 5302 - Phonological Theory I (3.0 cr)
LING 5303 - Phonological Theory II (3.0 cr)
LING 5461 - Conversation Analysis (3.0 cr)
LING 5601 - Historical Linguistics (3.0 cr)
LING 5900 - Topics in Linguistics (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
Twin Cities Campus
History M.A.
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Email: histdgs@umn.edu
Website: https://cla.umn.edu/history/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The History graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the History PhD program. For more information, refer to the History program website: www.hist.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
The History graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the History PhD program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B comprises three expanded seminar papers, completed in consultation with the advisor.

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This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: One language other than English

A minimum GPA of 3.50 is required for students to remain in good standing.

Students are only admitted to the PhD program. They may complete an MA while studying for the PhD.

Reading proficiency in one language other than English is required. Some areas of concentration require more than one. In some cases, competence in quantitative methods may replace one of the foreign languages.

**Core Course (3 credits)**

Take the following course:

**HIST 8015** - Scope and Methods of Historical Studies (3.0 cr)

**History Electives (12 to 21 credits)**

Plan A students select 12 credits, and Plan B students select 21 credits from the following in consultation with the advisor:

- **HIST 5053** - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
- **HIST 5264** - Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries (3.0 cr)
- **HIST 5265** - 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime (3.0 cr)
- **HIST 5461** - Introduction to East Asia I: The Imperial Age (3.0 cr)
- **HIST 5462** - From Subjects to Citizens: The History of East Asia From 1500 to the Present (3.0 cr)
- **HIST 5478** - Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present (3.0 cr)
- **HIST 5479** - Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present (3.0 cr) *(Inactive)*
- **HIST 5513** - North Africa since 1500: Islam, Colonialism, and Independence (3.0 cr)
- **HIST 5547** - Empire and Nations in the Middle East (3.0 cr)
- **HIST 5708** - The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800 [AH, TS] (3.0 cr)
- **HIST 5711** - Cognitive History (3.0 cr)
- **HIST 5801** - Seminar in Early American History (3.0 cr)
- **HIST 5802** - Readings in American History, 1848-Present (3.0 cr)
- **HIST 5831** - Cultural Fallout: The Cold War and Its Legacy: Readings (3.0 cr)
- **HIST 5890** - Readings in American Indian and Indigenous History (3.0 cr)
- **HIST 5901** - Latin America Proseminar: Colonial (3.0 cr)
- **HIST 5902** - Latin America Proseminar: Modern (3.0 cr)
- **HIST 5910** - Topics in U.S. History (1.0 - 4.0 cr)
- **HIST 5932** - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
- **HIST 5960** - Topics in History (1.0 - 4.0 cr)
- **HIST 5993** - Directed Study (1.0 - 16.0 cr)
- **HIST 5994** - Directed Research (1.0 - 16.0 cr)
- **HIST 8015** - Scope and Methods of Historical Studies (3.0 cr)
- **HIST 8025** - Politics of Historical Memory (3.0 cr)
- **HIST 8031** - Doing Digital History (3.0 cr)
- **HIST 8032** - Archives (3.0 cr)
- **HIST 8122** - Public Histories (3.0 cr)
- **HIST 8245** - Human Rights: A Global History (3.0 cr)
- **HIST 8540** - Topics in Mediterranean Studies (1.0 - 4.0 cr)
- **HIST 8630** - Seminar in World History (3.0 cr)
- **HIST 8644** - Legal History Workshop (3.0 cr)
- **HIST 8645** - American Legal History (3.0 cr)
- **HIST 8801** - Seminar in Early American History (3.0 cr)
- **HIST 8802** - Readings in American History, 1848-Present (3.0 cr)
- **HIST 8993** - Directed Study (1.0 - 16.0 cr)
- **HIST 8994** - Directed Research (1.0 - 16.0 cr)
- **HIST 8990** - Topics in Comparative History-Research (3.0 cr)
- **HIST 8993** - Directed Study (1.0 - 16.0 cr)
- **HIST 8994** - Directed Research (1.0 - 16.0 cr)

**Outside Coursework (6 credits)**

Select 6 credits outside the major in consultation with the advisor.

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Information current as of November 07, 2022
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<td>The Production of Knowledge, Negotiating the Past, and the Writing of African Histories</td>
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<td>AFRO 8202</td>
<td>Seminar: Intellectual History of Race</td>
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<td>AFRO 8910</td>
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<td>Cultural Fallout: The Cold War and Its Legacy, Readings</td>
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<td>Seminar: Issues in Early Modern Visual Culture</td>
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<td>Ancient Israel: From Conquest to Exile [WI]</td>
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<td>Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change</td>
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<td>Readings in American Minority Literature</td>
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<td>Readings in Criticism and Theory</td>
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<td>Troubadour Lyric and Old Occitan Language</td>
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<td>Directed Readings for Graduate Students</td>
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<td>GEOG 5385</td>
<td>Globalization and Development: Political Economy</td>
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<td>GEOG 8230</td>
<td>Theoretical Geography</td>
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<td>GEOG 8302</td>
<td>Research Development</td>
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<tr>
<td>GEOG 8980</td>
<td>Topics: Geography</td>
<td>1.0 - 3.0 cr</td>
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</table>
Plan Options

Plan A

Thesis Credits
  Take 10 master's thesis credits.
  HIST 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Twin Cities Campus
History Minor
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840); fax: (612-624-7096)
Email: histdgs@umn.edu
Website: https://cla.umn.edu/history/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of concentration in the history minor include Africa; ancient history; East and South Asia; late antiquity and the middle ages; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, Institute for Advanced Study, and Consortium for the Study of the Premodern World.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students intending to minor in History must gain approval from their major field advisor and director of graduate studies, as well as the History director of graduate studies regarding timing and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
27 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: At least one language other than English

A minimum GPA of 3.50 is required for students to remain in good standing.

At least one language requirement must be satisfied prior to the preliminary oral examination.

Coursework (6 to 12 credits)
Masters students select 6 credits from the following list. Doctoral students must take HIST 8015 and 9 additional credits from the list.
Courses are selected in consultation with the History director of graduate studies.
HIST 5053 - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
HIST 5264 - Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries (3.0 cr)
HIST 5265 - 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime (3.0 cr)
HIST 5461 - Introduction to East Asia I: The Imperial Age (3.0 cr)
HIST 5462 - From Subjects to Citizens: The History of East Asia From 1500 to the Present (3.0 cr)
HIST 5478 - Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present (3.0 cr)
HIST 5479 (Inactive) (3.0 cr)
HIST 5513 - North Africa since 1500: Islam, Colonialism, and Independence (3.0 cr)
HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
HIST 5704 - The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800 [AH, TS] (3.0 cr)
HIST 5711 - Cognitive History (3.0 cr)
HIST 5801 - Seminar in Early American History (3.0 cr)
HIST 5802 - Readings in American History, 1848-Present (3.0 cr)
HIST 5831 - Cultural Fallout: The Cold War and Its Legacy: Readings (3.0 cr)
HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)
HIST 5901 - Latin America Proseminar: Colonial (3.0 cr)
HIST 5902 - Latin America Proseminar: Modern (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 5993 - Directed Study (1.0 - 16.0 cr)
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
HIST 8021 - History Research Seminar (3.0 cr)
HIST 8025 - Politics of Historical Memory (3.0 cr)
HIST 8031 - Doing Digital History (3.0 cr)
HIST 8032 - Archives (3.0 cr)
HIST 8122 - Public Histories (3.0 cr)
HIST 8245 - Human Rights: A Global History (3.0 cr)
HIST 8540 - Topics in Mediterranean Studies (1.0 - 4.0 cr)
HIST 8630 - Seminar in World History (3.0 cr)
HIST 8644 - Legal History Workshop (3.0 cr)
HIST 8645 - American Legal History (3.0 cr)
HIST 8801 - Seminar in Early American History (3.0 cr)
HIST 8802 - Readings in American History, 1848-Present (3.0 cr)
HIST 8900 - Topics in European/Medieval History (1.0 - 4.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8930 - Topics in Ancient History (1.0 - 4.0 cr)
HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8980 - Topics in Comparative Women's History (3.0 - 4.0 cr)
HIST 8990 - Topics in Comparative History-Research (3.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HIST 8994 - Directed Research (1.0 - 16.0 cr)

History 8015
This course is optional for master's students and is required for doctoral students.
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
History Ph.D.
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840; fax: 612-624-7096)
Email: histdgs@umn.edu
Website: https://cla.umn.edu/history/graduate

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 63
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The History graduate program offers the following areas of concentration: Africa; ancient history; East and South Asia; late antiquity and the middle ages; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Jewish Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, Institute for Advanced Study, and Consortium for the Study of the Premodern World.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Completion of a Bachelor of Arts or equivalent. Applicants for whom English is not their first language must submit English language proficiency test scores.

Other requirements to be completed before admission:
Alternative English language tests, for applicants for whom English is not the first language, include the PTE Academic (Score: 59) and the Cambridge C1 Advanced (Score: 180). Contact the History Department for more information.

Special Application Requirements:
The preferred undergraduate GPA is 3.50 (on a 4.00 scale), with grades of A/A- for history coursework expected.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
27 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: At least one language other than English

A minimum GPA of 3.50 is required for students to remain in good standing.

At least one language requirement must be satisfied prior to the preliminary oral examination.

History Courses (6 credits)
Take HIST 8015 the first year of study, and HIST 8021 the second or third year of study.
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
HIST 8021 - History Research Seminar (3.0 cr)

Electives (21 credits)
Select 21 credits from the following in consultation with the advisor:
HIST 5053 - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
HIST 5264 - Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries (3.0 cr)
HIST 5265 - 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime (3.0 cr)
HIST 5461 - Introduction to East Asia I: The Imperial Age (3.0 cr)
HIST 5462 - From Subjects to Citizens: The History of East Asia From 1500 to the Present (3.0 cr)
HIST 5478 - Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present (3.0 cr)
HIST 5479 - (Inactive) (3.0 cr)
HIST 5513 - North Africa since 1500: Islam, Colonialism, and Independence (3.0 cr)
HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
HIST 5708 - The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800 [AH, TS] (3.0 cr)
HIST 5711 - Cognitive History (3.0 cr)
HIST 5801 - Seminar in Early American History (3.0 cr)
HIST 5802 - Readings in American History, 1848-Present (3.0 cr)
HIST 5831 - Cultural Fallout: The Cold War and Its Legacy: Readings (3.0 cr)
HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)
HIST 5901 - Latin America Proseminar: Colonial (3.0 cr)
HIST 5902 - Latin America Proseminar: Modern (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 5993 - Directed Study (1.0 - 16.0 cr)
HIST 5994 - Directed Research (1.0 - 16.0 cr)
HIST 8025 - Politics of Historical Memory (3.0 cr)
HIST 8031 - Doing Digital History (3.0 cr)
HIST 8032 - Archives (3.0 cr)
HIST 8122 - Public Histories (3.0 cr)
HIST 8245 - Human Rights: A Global History (3.0 cr)
HIST 8540 - Topics in Mediterranean Studies (1.0 - 4.0 cr)
HIST 8630 - Seminar in World History (3.0 cr)
HIST 8644 - Legal History Workshop (3.0 cr)
HIST 8645 - American Legal History (3.0 cr)
HIST 8801 - Seminar in Early American History (3.0 cr)
HIST 8802 - Readings in American History, 1848-Present (3.0 cr)
HIST 8900 - Topics in European/Medieval History (1.0 - 4.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8930 - Topics in Ancient History (1.0 - 4.0 cr)
HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8980 - Topics in Comparative Women's History (3.0 - 4.0 cr)
HIST 8990 - Topics in Comparative History-Research (3.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HIST 8994 - Directed Research (1.0 - 16.0 cr)
Outside Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor:

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<td>The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)</td>
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<td>Directed Study (1.0 - 3.0 cr)</td>
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<td>AFRO 8202</td>
<td>Seminar: Intellectual History of Race (3.0 cr)</td>
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<td>Topics in Studies of Africa and the African Diaspora (3.0 cr)</td>
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RELS 5993 - Directed Studies (1.0 - 4.0 cr)
RUSS 5411 - Dostoevsky in Translation [LITR, GP] (3.0 cr)
RUSS 5993 - Directed Studies (1.0 - 4.0 cr)
SCAN 5701 - Old Norse Language and Literature (3.0 cr)
SCAN 5703 - Old Norse Poetry (3.0 cr)
SCAN 5993 - Directed Studies (1.0 - 4.0 cr)
SOC 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
SOC 8390 - Topics in Political Sociology (3.0 cr)
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
HIST 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Human Rights Minor
Global Studies Department
College of Liberal Arts

Link to a [list of faculty](#) for this program.

**Contact Information:**
Institute for Global Studies, 232 Social Sciences Building, 267 19th Ave S, Minneapolis, MN 55455 (612-626-1879; fax: 612-626-2242)
Email: hrminor@umn.edu
Website: [https://cla.umn.edu/human-rights](https://cla.umn.edu/human-rights)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The human rights minor provides an interdisciplinary foundation in human rights studies and practical experience in human rights work.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

**Special Application Requirements:**
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Human Rights director of graduate studies regarding feasibility and requirements.

A letter that includes information regarding the applicants background and motivation for pursuing the minor must be submitted to the Human Rights director of graduate studies.

A minimum GPA of 3.0 is required for admission to the minor.

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

All students pursuing the Human Rights minor must complete a non-credit, 6-week, professional internship in the field of human rights under the supervision of Human Rights director of graduate studies. The Human Rights director of graduate studies must approve internship placement. The 200 internship hours can be completed at any time during the course of study.

A maximum of 3 credits applied to the minor can be taken on the S/N grade basis. A minimum grade of B must be earned for each A-F course applied to the minor.

The minimum cumulative GPA for minor field coursework is 3.0.

**Core Coursework (6 credits)**
Select 6 credits from the following in consultation with the Human Rights director of graduate studies.
- [GLOS 5403 - Human Rights Advocacy](#) (3.0 cr)
- [HIST 8245 - Human Rights: A Global History](#) (3.0 cr)
- [LAW 6886 - International Human Rights Law](#) (3.0 cr)
- [PA 5885 - Human Rights Policy: Issues and Actors](#) (3.0 cr)
- [SOC 8171 - Cross-Disciplinary Perspectives in Human Rights](#) (3.0 cr)
Electives (3 to 6 credits)
Master's students select at least 3 credits, and doctoral students select at least 6 credits from the following in consultation with the Human Rights director of graduate studies:
- AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
- AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
- ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
- AMIN 5890 - Introduction to Clinical Ethics (3.0 cr)
- ANTH 5100 - Standards for Research with Human Participants: A Lecture Series for Researchers (1.0 cr)
- CHIC 5374 - Migrant Farmworkers in the United States: Families, Work, and Advocacy [CIV] (4.0 cr)
- CPH 5111 - Ways of Thinking about Health (2.0 cr)
- EPSY 5135 - Human Relations Workshop (4.0 cr)
- EPSY 5180 - Natural Resources in Sustainable International Development (3.0 cr)
- GLOS 5403 - Human Rights Advocacy (3.0 cr)
- HRIR 5252 - Employment and Labor Law for the HRIR Professional (2.0 cr)
- KIN 5371 - Sport and Society (3.0 cr)
- LAW 6030 - Contemporary Problems in Freedom of Speech and Press (3.0 cr)
- LAW 6046 - Human Trafficking (2.0 cr)
- LAW 6058 - Human Rights Advocacy (3.0 cr)
- LAW 6621 - Rights in Conflict: Citizenship and Human Rights (2.0 cr)
- LAW 6827 - Women's International Human Rights (2.0 cr)
- LAW 6889 - Laws of War (3.0 cr)
- LAW 7400 - CL: Human Rights Litigation and International Legal Advocacy (3.0 - 4.0 cr)
- LAW 7842 - CL: Immigration and Human Rights (3.0 - 4.0 cr)
- OLDP 5104 - Strategies for International Development of Education Systems (3.0 cr)
- PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
- PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
- PA 5414 [Inactive] (3.0 cr)
- PA 5421 - Racial Inequality and Public Policy (3.0 cr)
- PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
- PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
- PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)
- PA 5801 - Global Public Policy (3.0 cr)
- PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
- PA 5885 - Human Rights Policy: Issues and Actors (3.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
- POL 8260 - Topics in Political Theory (3.0 cr)
- POL 8403 - International Norms and Institutions (3.0 cr)
- POL 8460 - Topics in International Relations (3.0 cr)
- PSY 8210 - Law, Race, and Social Psychology (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Italian Studies Minor
French & Italian
College of Liberal Arts

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of French and Italian, 260 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Website: [http://frit.umn.edu/grad/italianminor.php](http://frit.umn.edu/grad/italianminor.php)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Italian Studies minor, available for students in areas such as art history, architecture, French, comparative literature, history, English, and music, is shaped through consultation with the Italian Studies graduate faculty to support students individual academic and professional objectives.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Students interested in the Italian Studies minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Italian Studies director of graduate studies regarding feasibility and requirements.

Proficiency in the Italian language is expected. Students proficiency to pursue the minor successfully will be determined by the Italian Studies director of graduate studies.

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Up to one 4-level course can be applied to the minor with the approval of the Italian Studies director of graduate studies.

FRIT 5999 cannot be applied toward the minor field requirement.

Coursework from the major field may not be applied to satisfy minor field requirements.

The minimum GPA for minor field coursework is 3.0.

**Required Coursework**
Master's students complete at least 6 credits and doctoral students complete at least 12 credits from the following in consultation with the Italian Studies director of graduate studies:
ITAL 5xxx
ITAL 8xxx
FRIT 5xxx
FRIT 8xxx

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Linguistics M.A.

Linguistics, Institute of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331
Email: ling@umn.edu
Website: https://cla.umn.edu/linguistics/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32 to 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Linguistics MA program trains students in the scientific study of the human mental capacity for language. Successful study in this area investigates the syntactic, phonological, and semantic/pragmatic properties of the language systems that humans naturally acquire, and asks what kinds of underlying mental capacity is implicated by these properties.

The program emphasizes the place of this field of study among the cognitive sciences, and provides coursework and individual advising to prepare students to engage with and produce research in the field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applicants must submit the following application materials by December 15 of the preceding academic year:
University of Minnesota Application form, which includes:
a CV or resume;
a statement of purpose;
a writing sample;
three letters of recommendation; and
transcripts from each college or university attended.

Entry is for fall semester only.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
- MELAB

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 23 major credits, 3 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 29 major credits and 3 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is an original paper that may develop out of a course project or independent research.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See other requirements (below)

A minimum GPA of 2.80 is required for students to remain in good standing.

Students must demonstrate competence (the equivalent of two or more years of study) in one language other than English.

Application of 4xxx-level coursework requires approval of the advisor and director of graduate studies.

**Required Coursework (23 credits)**

Take the following courses:
- LING 5001 - Introduction to Linguistics (4.0 cr)
- LING 5201 - Syntactic Theory I (3.0 cr)
- LING 5202 - Syntactic Theory II (3.0 cr)
- LING 5205 - Semantics (3.0 cr)
- LING 5302 - Phonological Theory I (3.0 cr)
- LING 8105 - Field Methods in Linguistics I (4.0 cr)
- LING 5207 - Advanced Semantics (3.0 cr)
  or LING 5303 - Phonological Theory II (3.0 cr)

**Outside Coursework (3 credits)**

Select 3 non-LING credits in consultation with the advisor.

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**Plan Options**

**Plan A**

**Thesis Credits**

Take 10 master's thesis credits.
- LING 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**OR**

**Plan B**

**Research Paper (3 credits)**

Take the following course:
- LING 8005 - Research Paper Workshop (3.0 cr)

Linguistics Electives (3 credits)

Select 3 credits from the following in consultation with the advisor. Other courses may be selected with advisor approval.
- LING 5206 - Linguistic Pragmatics (3.0 cr)
- LING 5207 - Advanced Semantics (3.0 cr)
- LING 5303 - Phonological Theory II (3.0 cr)
- LING 5461 - Conversation Analysis (3.0 cr)
- LING 5462 - Field Research in Spoken Language (3.0 cr)
- LING 5601 - Historical Linguistics (3.0 cr)
- LING 5801 - Introduction to Computational Linguistics (3.0 cr)
- LING 5993 - Directed Study (1.0 - 3.0 cr)
- LING 8106 - Field Methods in Linguistics II (4.0 cr)
- LING 8200 - Topics in Syntax and Semantics (3.0 cr)
- LING 8210 - Seminar in Syntax (3.0 cr)
- LING 8300 - Topics in Phonetics and Phonology (3.0 cr)
- LING 8500 - Topics in Second Language Acquisition (3.0 cr)
- LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
- LING 8921 - Seminar in Language and Cognition (3.0 cr)
- LING 8991 - Independent Study (1.0 - 4.0 cr)
Twin Cities Campus
Linguistics Minor
Linguistics, Institute of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455  (612-624-3331)
Email: ling@umn.edu
Website: https://cla.umn.edu/linguistics/graduate

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 10
• Length of program in credits (Doctorate): 16
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, and semantics/pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Linguistics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minimum cumulative GPA for minor field coursework is 2.80 for master's students and 3.00 for doctoral students.

Required Coursework (7 to 10 credits)
Masters students take LING 5001 plus either LING 5201 or LING 5302, in consultation with the Linguistics director of graduate studies, for a total of 7 credits. Doctoral students take all of the following courses for 10 credits.
LING 5001 - Introduction to Linguistics (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5302 - Phonological Theory I (3.0 cr)

Electives (3 to 6 credits)
Masters students select 3 credits, and doctoral students select 6 credits from the following in consultation with the Linguistics director of graduate studies. Master's students who take both LING 5201 and LING 5302 may count one of the courses as an elective with director of graduate studies approval.
LING 5202 - Syntactic Theory II (3.0 cr)
LING 5205 - Semantics (3.0 cr)
LING 5206 - Linguistic Pragmatics (3.0 cr)
LING 5303 - Phonological Theory II (3.0 cr)
LING 5461 - Conversation Analysis (3.0 cr)
LING 5462 - Field Research in Spoken Language (3.0 cr)
LING 5601 - Historical Linguistics (3.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
LING 5993 - Directed Study (1.0 - 3.0 cr)
LING 8005 - Research Paper Workshop (3.0 cr)
LING 8105 - Field Methods in Linguistics I (4.0 cr)
LING 8106 - Field Methods in Linguistics II (4.0 cr)
LING 8200 - Topics in Syntax and Semantics (3.0 cr)
LING 8210 - Seminar in Syntax (3.0 cr)
LING 8300 - Topics in Phonetics and Phonology (3.0 cr)
LING 8500 - Topics in Second Language Acquisition (3.0 cr)
LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
LING 8921 - Seminar in Language and Cognition (3.0 cr)
LING 8991 - Independent Study (1.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Linguistics Ph.D.
Linguistics, Institute of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331)
Email: ling@umn.edu
Website: https://cla.umn.edu/linguistics/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Linguistics PhD program trains students in the scientific study of the human mental capacity for language. Successful study in this area investigates the syntactic, phonological, and semantic/pragmatic properties of language systems that humans naturally acquire, and asks what kind of underlying mental capacity is implicated by these properties.

The program emphasizes the place of this field of study among the cognitive sciences, and provides coursework and individual advising to prepare students to engage with and produce research in the field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applicants must submit the following application materials by December 15 of the preceding academic year:
- University of Minnesota Application form, which includes:
  a CV or resume;
  a statement of purpose;
  a writing sample;
  three letters of recommendation; and
  transcripts from each college or university attended.

Entry is for fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
- MELAB

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
39 credits are required in the major.
9 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

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Information current as of November 07, 2022
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See below.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must demonstrate competence (the equivalent of two or more years of study) in one language other than English before the PhD can be awarded.

Application of 4xxx-level coursework requires approval of the advisor and director of graduate studies.

**Required Coursework (30 credits)**

Take the following courses:

- LING 5001 - Introduction to Linguistics (4.0 cr)
- LING 5201 - Syntactic Theory I (3.0 cr)
- LING 5202 - Syntactic Theory II (3.0 cr)
- LING 5205 - Semantics (3.0 cr)
- LING 5302 - Phonological Theory I (3.0 cr)
- LING 8005 - Research Paper Workshop (3.0 cr)
- LING 8105 - Field Methods in Linguistics I (4.0 cr)
- LING 8106 - Field Methods in Linguistics II (4.0 cr)
- LING 5207 - Advanced Semantics (3.0 cr)
  or LING 5303 - Phonological Theory II (3.0 cr)

**Linguistics Seminars (9 credits)**

Select 9 credits from the following in consultation with the advisor. 3 of the 9 credits must be taken at the 8xxx level. Other 5xxx-level or 8xxx-level courses, including second completions of required courses, may be selected with advisor and director of graduate studies approval.

- LING 8200 - Topics in Syntax and Semantics (3.0 cr)
- LING 8210 - Seminar in Syntax (3.0 cr)
- LING 8300 - Topics in Phonetics and Phonology (3.0 cr)
- LING 8500 - Topics in Second Language Acquisition (3.0 cr)
- LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
- LING 8921 - Seminar in Language and Cognition (3.0 cr)
- LING 8991 - Independent Study (1.0 - 4.0 cr)

**Outside Coursework (9 credits)**

Select 9 credits outside the major in consultation with the advisor and director of graduate studies.

**Thesis Credits**

Take 24 doctoral thesis credits.

- LING 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
- LING 8888W - Thesis Credit Dissertation Seminar (1.0 - 3.0 cr)
Twin Cities Campus
Literacy and Rhetorical Studies Minor
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Writing, 10 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-626-7583; fax: 612-626-7580)
Email: writing@umn.edu
Website: http://writing.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The goal of the literacy and rhetorical studies (LRS) minor is to encourage students to contribute to interdisciplinary activity and to create a forum for them and several dozen faculty members at the University whose research and teaching emphasize various facets of writing and communication. By crafting an individualized program of study with the LRS director of graduate studies, including theory, pedagogy, and research, often in a historical context, students can complement their disciplinary degree, and thereby open up new perspectives for their scholarship and teaching.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:

Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the LRS director of graduate studies regarding feasibility and requirements.

For specific information about applying for the LRS minor, see: http://writing.umn.edu/lrs/admission.html

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All courses are chosen in consultation with the LRS director of graduate studies as part of the application process, using the planning form available at http://writing.umn.edu/lrs/about.html

Masters minor:
- No more than 1 of the 3 courses applied to the minor may be from the home department.
- A substantial paper emerging from one of the three completed courses is required.

Doctoral minor:
- No more than 2 of the 4 courses applied to the minor may be from the home department.
- A capstone writing project emerging from the studies in literacy and/or rhetoric, such as a seminar paper or a completed dissertation chapter, is required.

Coursework (9 credits)
Literacy Theory or Practice Course (3 credits)
Select at least 3 credits in consultation with the LRS director of graduate studies.

Research Methods and Practices Course (3 credits)
Select at least 3 credits in consultation with the LRS director of graduate studies.

Historical Topic Course (3 credits)
Select at least 3 credits in consultation with the LRS director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral

Additional Coursework (3 credits)
Select 3 credits, in consultation with the LRS director of graduate studies, to complete the 12-credit doctoral minor.
Twin Cities Campus
Mass Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Hubbard School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN  55455 (612-625-1338; fax: 612-625-9525)
Email: sjmcgrad@umn.edu
Website: https://hsjmc.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 35
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's degree in mass communication emphasizes the theoretical study of mass communication and analysis of media systems and effects. The degree is intended for those who wish to pursue PhD degrees or teaching and research careers, as well as those who seek communication-related professional careers. The general master's program is not designed to provide professional skills training in journalism. Individuals with a bachelor's degree in journalism and mass communication or with strong social science or liberal arts backgrounds in areas such as political science, psychology, sociology, history, and English are encouraged to apply. Individuals with extensive professional experience in mass communication are also welcome. The program is suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students for whom English is a second language must meet the minimum acceptable level of spoken-English proficiency either by submitting TOEFL speaking test score of 18 or higher or SETTA test ELP rating of 4 or higher.

Admission is considered for fall semester only; the priority application deadline is December 15, with a rolling deadline determined year to year as needed.

Applicants interested in the MA in Mass Communication/JD degree must submit applications to Mass Communication and the Law School, which are reviewed separately. Applicants are asked to identify their intention to pursue the joint degree in their MA statement of intent. For more information, contact sjmcgrad@umn.edu.

Special Application Requirements:
Applicants must submit a department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; and a resume or curriculum vita.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Plan A: Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All coursework offered on both the A-F and S/N grade basis must be taken A-F.

Mass Communication Theory Core Requirements (4 credits)
Take the following courses:
JOUR 8001 - Studies and Theories of Mass Communication (3.0 cr)
JOUR 8009 - Pro-seminar in Mass Communication (1.0 cr)

Second Theory Requirement (3 credits)
Select 3 credits from the following in consultation with the advisor. Other JOUR courses can be applied to this requirement with adviser approval.
JOUR 8002 - Studies in Mass Communication II (3.0 cr)
JOUR 8003 - Digital Media Issues and Theories (3.0 cr)
JOUR 8514 - Seminar: Advanced Mass Communication Theories (3.0 cr)
JOUR 8602 - Seminar: History of Mass Communication (3.0 cr)
JOUR 8611 - Journalism Studies Theory and Research (3.0 cr)
JOUR 8620 - Seminar: Advertising Theory and Research (3.0 cr)
JOUR 8621 - Seminar: Public Relations Theory and Research (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
JOUR 8651 - Seminar: Mass Communication, Audiences, and Society (3.0 cr)
JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
JOUR 8675 - Seminar: Issues in Information Access and Communication (3.0 cr)
JOUR 8678 - Seminar: Constitutional Law--Theories of Freedom of Expression (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
JOUR 8720 - Health Communication Theory and Research (3.0 cr)

Methodology Core Requirements (3 credits)
Take the following courses:
JOUR 8501 - Research Methods in Mass Communication (3.0 cr)

Second Method Requirement (3 credits)
Select from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
JOUR 8500 - Seminar: Advanced Methods Special Topics (3.0 cr)
JOUR 8502 - Advanced Quantitative Research Methods (3.0 cr)
JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
JOUR 8601 - Seminar: Methods in Mass Communication History Research (3.0 cr)
JOUR 8679 - Seminar: Research Methods in Media Ethics and Law (3.0 cr)

Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
JOUR 5541 - Mass Communication and Public Health (3.0 cr)
JOUR 5552 - Law of Internet Communication (3.0 cr)
JOUR 5601W - History of Journalism [WI] (3.0 cr)
JOUR 5725 - Management of Media Organizations (3.0 cr)
JOUR 5777 - Contemporary Problems in Freedom of Speech and Press (3.0 cr)
JOUR 8002 - Studies in Mass Communication II (3.0 cr)
JOUR 8003 - Digital Media Issues and Theories (3.0 cr)
JOUR 8500 - Seminar: Advanced Methods Special Topics (3.0 cr)
JOUR 8502 - Advanced Quantitative Research Methods (3.0 cr)
JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
JOUR 8514 - Seminar: Advanced Mass Communication Theories (3.0 cr)
JOUR 8601 - Seminar: Methods in Mass Communication History Research (3.0 cr)
JOUR 8602 - Seminar: History of Mass Communication (3.0 cr)
JOUR 8603 - Seminar: Theories and Models in Mass Communication History Research (3.0 cr)
JOUR 8611 - Journalism Studies Theory and Research (3.0 cr)
JOUR 8620 - Seminar: Advertising Theory and Research (3.0 cr)
JOUR 8621 - Seminar: Public Relations Theory and Research (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
JOUR 8651 - Seminar: Mass Communication, Audiences, and Society (3.0 cr)
JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
JOUR 8673 - Seminar: Media Management (3.0 cr)
JOUR 8675 - Seminar: Issues in Information Access and Communication (3.0 cr)
JOUR 8678 - Seminar: Constitutional Law--Theories of Freedom of Expression (3.0 cr)
JOUR 8679 - Seminar: Research Methods in Media Ethics and Law (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
JOUR 8720 - Health Communication Theory and Research (3.0 cr)
JOUR 8721 - Media Organizations as Institutions (3.0 cr)
JOUR 8801 - Seminar: Comparative Research in Mass Communication, a Cross-National Approach (3.0 cr)
JOUR 8990 - Special Problems in Mass Communications (3.0 cr)
JOUR 8993 - Directed Study (1.0 - 6.0 cr)

Outside Coursework (6 credits)
Select 6 credits of outside coursework, in consultation with the advisor, from the following. Other courses can be applied to this requirement with advisor approval.
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
COMM 8611 - Seminar: Rhetoric (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5245 - Advanced Survey Data Analysis for Categorical and Rating Scale Data (1.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
HIST 8021 - History Research Seminar (3.0 cr)
HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
LAW 6007 - Constitutional Law: Federalism and Separation of Powers (3.0 cr)
LAW 6103 - Data Privacy Law (3.0 cr)
LAW 6207 - Antitrust (3.0 cr)
LAW 6650 - Advanced Administrative Law (3.0 cr)
LAW 6804 - Government Secrecy (2.0 cr)
LAW 6832 - Cybercrime and Cybersecurity (2.0 cr)
MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)
MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
MKTG 8842 - Quantitative Modeling I (2.0 cr)

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MKTG 8843 - Empirical Quantitative Models (4.0 cr)
MKTG 8851 - Seminar: Marketing Management and Strategy I (2.0 cr)
MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
MSBA 6311 - Programming for Data Science (3.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6411 - Exploratory Data Analytics (3.0 cr)
MSBA 6421 - Predictive Analytics (3.0 cr)
POL 8360 - Topics in American Politics (3.0 cr)
POL 8460 - Topics in International Relations (3.0 cr)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5052 - Psychology of Attention (3.0 cr)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5205 - Applied Social Psychology (3.0 cr)
PSY 5206 - Social Psychology and Health Behavior (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 5708 - Organizational Psychology (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8205 - Principles of Social Psychology (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)
PUBH 6250 - Foundations of Public Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
SOC 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
SOC 8853 - Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
LAW 5026 - Intellectual Property In Practice (1.0 cr)
or LAW 6926 - Intellectual Property In Practice (1.0 cr)
LAW 5908 - Independent Research and Writing (1.0 - 2.0 cr)
LAW 7606 - Independent Research and Writing (1.0 - 2.0 cr)
LAW 7608 - Independent Research and Writing (1.0 - 3.0 cr)

**Thesis Credits**
Take 10 master's thesis credits.
JOUR 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Joint- or Dual-degree Coursework:** JD/MA-Mass Communication: Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Mass Communication Minor
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Hubbard School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-625-1338; fax: 612-625-9525).
Email: simcgrad@umn.edu
Website: https://hsjmc.umn.edu/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mass communication program emphasizes the theoretical study of mass communication and analysis of media systems and effects. The program is not designed to provide professional skills training in journalism.

Areas of specialization include media processes, influences, and effects (including journalism, health communication, advertising, public relations, and political communication); media law, ethics, history; and media management. All programs are suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Mass Communication director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor field coursework must be selected in consultation with the Mass Communication director of graduate studies.

Coursework (6 to 12 credits)
Masters students select 6 credits, and doctoral students select 12 credits in consultation with the Mass Communication director of graduate studies. At least 6 of the 12 credits applied to the doctoral minor must be from 8000-level courses.
JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
JOUR 5541 - Mass Communication and Public Health (3.0 cr)
JOUR 5552 - Law of Internet Communication (3.0 cr)
JOUR 5601W - History of Journalism [WI] (3.0 cr)
JOUR 5725 - Management of Media Organizations (3.0 cr)
JOUR 5777 - Contemporary Problems in Freedom of Speech and Press (3.0 cr)
JOUR 8001 - Studies and Theories of Mass Communication (3.0 cr)
JOUR 8002 - Studies in Mass Communication II (3.0 cr)
JOUR 8003 - Digital Media Issues and Theories (3.0 cr)
JOUR 8500 - Seminar: Advanced Methods Special Topics (3.0 cr)
JOUR 8501 - Research Methods in Mass Communication (3.0 cr)

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JOUR 8502 - Advanced Quantitative Research Methods (3.0 cr)
JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
JOUR 8514 - Seminar: Advanced Mass Communication Theories (3.0 cr)
JOUR 8601 - Seminar: Methods in Mass Communication History Research (3.0 cr)
JOUR 8602 - Seminar: History of Mass Communication (3.0 cr)
JOUR 8603 - Seminar: Theories and Models in Mass Communication History Research (3.0 cr)
JOUR 8611 - Journalism Studies Theory and Research (3.0 cr)
JOUR 8620 - Seminar: Advertising Theory and Research (3.0 cr)
JOUR 8621 - Seminar: Public Relations Theory and Research (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
JOUR 8651 - Seminar: Mass Communication, Audiences, and Society (3.0 cr)
JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
JOUR 8673 - Seminar: Media Management (3.0 cr)
JOUR 8675 - Seminar: Issues in Information Access and Communication (3.0 cr)
JOUR 8678 - Seminar: Constitutional Law—Theories of Freedom of Expression (3.0 cr)
JOUR 8679 - Seminar: Research Methods in Media Ethics and Law (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
JOUR 8720 - Health Communication Theory and Research (3.0 cr)
JOUR 8721 - Media Organizations as Institutions (3.0 cr)
JOUR 8990 - Special Problems in Mass Communications (3.0 cr)
JOUR 8993 - Directed Study (1.0 - 6.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Mass Communication Ph.D.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Hubbard School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-625-1338; fax: 612-625-9525)
Email: sjmcgrad@umn.edu
Website: https://hsjmc.umn.edu/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Mass Communication PhD offers training for academic careers primarily in mass communication instruction, research, or policy. Areas of specialization include media processes, influences, and effects (including journalism, health communication, advertising, public relations, and political communication); media law, ethics, history; and media management. The program is suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students for whom English is a second language must meet the minimum acceptable level of spoken-English proficiency either by submitting TOEFL speaking test score of 18 or higher or SETTA test ELP rating of 4 or higher.

Admission is considered for fall semester only; the application deadline is December 15.

Applicants interested in the PhD in Mass Communication/JD degree must submit applications to Mass Communication and the Law School, which are reviewed separately. Applicants are asked to identify their intention to pursue the joint degree in their PhD statement of intent. For more information, contact sjmcgrad@umn.edu.

Special Application Requirements:
Applicants must submit a department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; and a resume or curriculum vita.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
34 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.5 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All coursework offered on the A-F and S/N grade basis must be taken A-F.

**Mass Communication Theory Core Requirements (4 credits)**

Take the following courses:

- JOUR 8001 - Studies and Theories of Mass Communication (3.0 cr)
- JOUR 8009 - Pro-seminar in Mass Communication (1.0 cr)

**Second Theory Requirement (3 credits)**

Select 3 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.

- JOUR 8002 - Studies in Mass Communication II (3.0 cr)
- JOUR 8003 - Digital Media Issues and Theories (3.0 cr)
- JOUR 8514 - Seminar: Advanced Mass Communication Theories (3.0 cr)
- JOUR 8602 - Seminar: History of Mass Communication (3.0 cr)
- JOUR 8611 - Journalism Studies Theory and Research (3.0 cr)
- JOUR 8620 - Seminar: Advertising Theory and Research (3.0 cr)
- JOUR 8621 - Seminar: Public Relations Theory and Research (3.0 cr)
- JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
- JOUR 8651 - Seminar: Mass Communication, Audiences, and Society (3.0 cr)
- JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
- JOUR 8675 - Seminar: Issues in Information Access and Communication (3.0 cr)
- JOUR 8678 - Seminar: Constitutional Law--Theories of Freedom of Expression (3.0 cr)
- JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
- JOUR 8720 - Health Communication Theory and Research (3.0 cr)
- JOUR 8721 - Media Organizations as Institutions (3.0 cr)

**Methodology Core Requirements (3 credits)**

Take the following course:

- JOUR 8501 - Research Methods in Mass Communication (3.0 cr)

**Additional Method Requirement (6 credits)**

Select 6 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval. At least one JOUR course must be used to fill the methods requirement.

- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
- HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
- HIST 8021 - History Research Seminar (3.0 cr)
- JOUR 8500 - Seminar: Advanced Methods Special Topics (3.0 cr)
- JOUR 8502 - Advanced Quantitative Research Methods (3.0 cr)
- JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
- JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
- JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
- JOUR 8601 - Seminar: Methods in Mass Communication History Research (3.0 cr)
- JOUR 8679 - Seminar: Research Methods in Media Ethics and Law (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
SOC 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
SOC 8853 - Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)

Electives (18 credits)
Select 18 credits in consultation with the advisor from the following. Other courses can be applied to this requirement with advisor approval.
JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
JOUR 5541 - Mass Communication and Public Health (3.0 cr)
JOUR 5552 - Law of Internet Communication (3.0 cr)
JOUR 5601W - History of Journalism [WI] (3.0 cr)
JOUR 5725 - Management of Media Organizations (3.0 cr)
JOUR 5777 - Contemporary Problems in Freedom of Speech and Press (3.0 cr)
JOUR 8002 - Studies in Mass Communication II (3.0 cr)
JOUR 8003 - Digital Media Issues and Theories (3.0 cr)
JOUR 8500 - Seminar: Advanced Methods Special Topics (3.0 cr)
JOUR 8502 - Advanced Quantitative Research Methods (3.0 cr)
JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
JOUR 8514 - Seminar: Advanced Mass Communication Theories (3.0 cr)
JOUR 8601 - Seminar: Methods in Mass Communication History Research (3.0 cr)
JOUR 8602 - Seminar: History of Mass Communication (3.0 cr)
JOUR 8603 - Seminar: Theories and Models in Mass Communication History Research (3.0 cr)
JOUR 8611 - Journalism Studies Theory and Research (3.0 cr)
JOUR 8620 - Seminar: Advertising Theory and Research (3.0 cr)
JOUR 8621 - Seminar: Public Relations Theory and Research (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
JOUR 8651 - Seminar: Mass Communication, Audiences, and Society (3.0 cr)
JOUR 8673 - Seminar: Media Management (3.0 cr)
JOUR 8675 - Seminar: Issues in Information Access and Communication (3.0 cr)
JOUR 8678 - Seminar: Constitutional Law--Theories of Freedom of Expression (3.0 cr)
JOUR 8679 - Seminar: Research Methods in Media Ethics and Law (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
JOUR 8720 - Health Communication Theory and Research (3.0 cr)
JOUR 8721 - Media Organizations as Institutions (3.0 cr)
JOUR 8801 - Seminar: Comparative Research in Mass Communication, a Cross-National Approach (3.0 cr)
JOUR 8990 - Special Problems in Mass Communications (3.0 cr)
JOUR 8993 - Directed Study (1.0 - 6.0 cr)

Outside Coursework (12 credits)
Select 12 credits of outside coursework, in consultation with the advisor, from the following. Other courses can be applied to this requirement with advisor approval.
ANTH 8001 - Ethnography, Theory, History (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
COMM 8611 - Seminar: Rhetoric (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5245 - Advanced Survey Data Analysis for Categorical and Rating Scale Data (1.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
EPSY 8118 - Advanced Cognitive Psychology (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8265 - Factor Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
EPSY 8283 - Research Synthesis and Meta-Analysis (3.0 cr)
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
HIST 8021 - History Research Seminar (3.0 cr)
HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
LAW 6007 - Constitutional Law: Federalism and Separation of Powers (3.0 cr)
LAW 6103 - Data Privacy Law (3.0 cr)
LAW 6207 - Antitrust (3.0 cr)
LAW 6650 - Advanced Administrative Law (3.0 cr)
LAW 6804 - Government Secrecy (2.0 cr)
LAW 6832 - Cybercrime and Cybersecurity (2.0 cr)
MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)
MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
MKTG 8842 - Quantitative Modeling I (2.0 cr)
MKTG 8843 - Empirical Quantitative Models (4.0 cr)
MKTG 8851 - Seminar: Marketing Management and Strategy I (2.0 cr)
MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
MSBA 6311 - Programming for Data Science (3.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6411 - Exploratory Data Analytics (3.0 cr)
MSBA 6421 - Predictive Analytics (3.0 cr)
POL 8360 - Topics in American Politics (3.0 cr)
POL 8460 - Topics in International Relations (3.0 cr)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5052 - Psychology of Attention (3.0 cr)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5205 - Applied Social Psychology (3.0 cr)
PSY 5206 - Social Psychology and Health Behavior (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 5708 - Organizational Psychology (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8205 - Principles of Social Psychology (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)
PSY 8820 - Research Methods in Social Psychology (3.0 cr)
PSY 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
PSY 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
PSY 8853 - Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)

Subgroup
LAW 5026 - Intellectual Property In Practice (1.0 cr)
or LAW 6926 - Intellectual Property In Practice (1.0 cr)

Subgroup 1
LAW 5908 - Independent Research and Writing (1.0 - 2.0 cr)
or LAW 7606 - Independent Research and Writing (1.0 - 2.0 cr)
or LAW 7608 - Independent Research and Writing (1.0 - 3.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
JOUR 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework: JD/ Mass Communications PhD
Twin Cities Campus
Medieval Studies Minor
Premodern Studies, Center for
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Premodern Studies. 1030 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-626-0805).
Email: cmedst@umn.edu
Website: http://cmedst.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Medieval Studies minor covers the period between 300 and 1500 B.C.E. It includes the history, art history, theater and music history, literature, and languages of the period. The program allows students with an interest in the medieval period, or who are planning to pursue graduate work in one of the related areas, to concentrate their studies as a coherent whole.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and director of graduate studies for the Center of Premodern Studies regarding feasibility and requirements.

Students must complete an application for the minor (available on the CMS website or in the office) and return it to the Center for Premodern Studies director of graduate studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Use of 4xxx courses toward the minor is permitted only with the permission of the director of graduate studies in the Center of Premodern Studies.

The minimum cumulative GPA for minor field coursework is 3.00.

Latin/Medieval Vernacular Coursework (3 to 6 credits)
Master’s and doctoral students select 3 credits that demonstrate a command of Latin. LAT 5100 is recommended; however, another course can be substituted. Doctoral students select an additional 3 credits to meet this requirement.

All courses selected must be outside the students major field and must be approved by the director of graduate studies.
ARAB 4xxx
CHN 5211 - Introductory Classical Chinese I (3.0 cr)
CHN 5212 - Introductory Classical Chinese II (3.0 cr)
DTCH 4001 - Beginning Dutch for Graduate Research (5.0 cr)
DTCH 4003 - Intermediate Dutch for Graduate Research (5.0 cr)
FREN 4001 - Beginning French for Graduate Student Research I (5.0 cr)
FREN 4002 - Beginning French for Graduate Student Research II (5.0 cr)
FREN 4004 - Intermediate French for Graduate Student Research II (5.0 cr)
GER 4001 - Beginning German for Graduate Research (5.0 cr)
GER 4002 - Beginning German for Graduate Research (5.0 cr)
GER 4004 - Intermediate German for Graduate Research (5.0 cr)
GRK 5003 - Intermediate Greek Prose for Graduate Student Research (4.0 cr)
HEBR 4011 - Intermediate Hebrew I for Graduate Student Research (5.0 cr)
HEBR 4104 - Beginning Biblical Hebrew I for Graduate Student Research (5.0 cr)
JPN 5211 - Introductory Classical Chinese I (3.0 cr)
KOR 5211 - Introductory Classical Chinese I (3.0 cr)
LAT 5100 - Advanced Readings in Latin Poetry (3.0 cr)
NOR 4001 - Beginning Norwegian for Graduate Research (5.0 cr)
NOR 4003 - Intermediate Norwegian for Graduate Research (5.0 cr)
PORT 4103 - Intermediate Portuguese for Graduate Student Research (5.0 cr)
RUSS 4101 - Beginning Russian for Graduate Research I (5.0 cr)
RUSS 4103 - Intermediate Russian for Graduate Research I (5.0 cr)
SCAN 4011 - Readings in Scandinavian Languages (2.0 cr)
SPAN 4001 - Beginning Spanish for Graduate Student Research (5.0 cr)
SPAN 4003 - Intermediate Spanish for Graduate Student Research (5.0 cr)
SWED 4001 - Beginning Swedish for Graduate Research (5.0 cr)
SWED 4003 - Intermediate Swedish for Graduate Research (5.0 cr)

Medieval Studies/Medieval Topics Coursework (3 to 6 credits)
Master's students select 3 credits and doctoral students select 6 credits from the following list, or other courses in consultation with the Medieval Studies director of graduate studies. Courses must be outside the student's major field. All courses must be approved by the Medieval Studies director of graduate studies.

ANTH 5442 - Archaeology of the British Isles (3.0 cr)
ARCH 5423 - Gothic Architecture (3.0 cr)
ARTH 5765 - Early Chinese Art (3.0 cr)
CNRC 8513 - Scripture and Interpretation (3.0 cr)
CNRC 8570 - Readings in Religious Texts (3.0 cr)
GRK 5003 - Intermediate Greek Prose for Graduate Student Research (4.0 cr)
HIST 5271 - The Viking World: Story, History, and Archaeology (3.0 cr)
HIST 8110 - Medieval History: Research Seminar (3.0 cr)
LAT 5200 - Advanced Readings in Latin Prose (3.0 cr)
LAT 8263 - Survey of Latin Literature II (3.0 cr)
LAT 8267 - Graduate Survey of Latin Literature of Late Antiquity (3.0 cr)
MEST 5610 - Advanced Topics in Medieval Studies (3.0 - 4.0 cr)
MEST 5993 - Directed Studies in Medieval Studies (1.0 - 3.0 cr)
MEST 8010 - Medieval Studies Colloquium (3.0 cr)
MEST 8110 - Seminar in Medieval Studies (3.0 - 4.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
PHIL 8080 - Seminar: History of Ancient and Medieval Philosophy (3.0 cr)
POL 8251 - Ancient and Medieval Political Thought (3.0 cr)
RELS 8190 - Comparative Seminar in Religions in Antiquity (3.0 cr)
SCAN 5502 - The Icelandic Saga (3.0 cr)
SCAN 5701 - Old Norse Language and Literature (3.0 cr)
SCAN 5703 - Old Norse Poetry (3.0 cr)
SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)
SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
SPAN 5701 - History of Ibero-Romance (3.0 cr)
SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)

Old English I
ENGL 4612 - Old English I (3.0 cr)
or MEST 4612 - Old English I (3.0 cr)

Old English II
ENGL 4613 - Old English II (3.0 cr)
or MEST 4613 - Old English II (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.
Twin Cities Campus
Moving Image Studies Minor
*Cultural Studies & Comparative Literature*
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, Room 235 NichH 3882 216 Pillsbury Dr S E Minneapolis, MN 55455 (612-624-8099)
Email: mims@umn.edu
Website: https://cla.umn.edu/mims

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The moving image increasingly permeates the fabric of contemporary culture and society. From cinema theaters and home televisions to installation art, portable electronic devices, medical technologies, and science laboratories, and in public spaces from airport terminals to building façades, the moving image is nearly ubiquitous.

The graduate minor in moving image studies trains students from a variety of disciplinary fields in the critical analysis of the moving image in its disparate yet interrelated forms. Drawing from the faculty's extensive research interests and expertise, the curriculum brings together discourses ranging from film theory to media studies, from the philosophy of the image to the history of technology, and beyond.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, the Moving Image Studies director of graduate studies, and the Film Studies Coordinator regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minimum cumulative GPA for minor field coursework is 3.50.

**Required Courses (6 credits)**
Take the following courses:
- MIMS 8001 - Theories of the Moving Image (3.0 cr)
- MIMS 8003 - Historiography of the Moving Image (3.0 cr)

**Electives (3 to 9 credits)**
Masters students select 3 credits, and doctoral students select 9 credits in consultation with the Moving Image Studies director of graduate studies to complete minimum credit requirements. Topics courses must be approved by the director of graduate studies to count towards the minor. Other courses can be applied to the minor with Moving Image Studies director of graduate studies approval.
- AFRO 8590 - Contemporary Literary and Cultural Studies (3.0 cr)
- AMES 5620 - Topics in South Asian Culture (3.0 cr)
- AMES 5920 - Topics in Asian Culture (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AMIN 5402</td>
<td>American Indians and the Cinema [AH, DSJ]</td>
<td>3.0 cr</td>
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<tr>
<td>AMIN 8301</td>
<td>Critical Indigenous Theory</td>
<td>3.0 cr</td>
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<tr>
<td>ARTH 5413</td>
<td>Alternative Media: Video, Performance, Digital Art</td>
<td>3.0 cr</td>
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<tr>
<td>ARTH 5950</td>
<td>Topics: Art History</td>
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<td>ARTS 5230</td>
<td>Advanced Art + Sound</td>
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<td>ARTS 5750</td>
<td>Advanced Narrative Digital Filmmaking</td>
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<td>ARTS 5760</td>
<td>Experimental Film and Video</td>
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<td>ARTS 5780</td>
<td>Advanced Super 8 and 16 MM Filmmaking</td>
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<tr>
<td>COMM 5211</td>
<td>Critical Media Studies: Theory and Methods</td>
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<tr>
<td>COMM 5261</td>
<td>Political Economy of Media Culture</td>
<td>3.0 cr</td>
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<td>COMM 8110</td>
<td>Seminar: Communication Research Methods</td>
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<td>COMM 8210</td>
<td>Seminar: Selected Topics in U.S. Electronic Media</td>
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<td>CSCL 5411</td>
<td>Avant-Garde Cinema</td>
<td>4.0 cr</td>
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<tr>
<td>CSCL 5910</td>
<td>Topics in Cultural Studies and Comparative Literature</td>
<td>3.0 - 4.0 cr</td>
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<td>FREN 5350</td>
<td>Topics in Literature and Culture</td>
<td>3.0 cr</td>
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<tr>
<td>FREN 8240</td>
<td>Critical Issues: French and Francophone Cinema</td>
<td>3.0 cr</td>
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<tr>
<td>GER 5410</td>
<td>Topics in German Literature</td>
<td>3.0 cr</td>
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<tr>
<td>GER 5630</td>
<td>Topics in German Cinema</td>
<td>3.0 cr</td>
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<tr>
<td>RUSS 5604</td>
<td>Russia At The Movies: A Survey Of The History Of Russian Cinema [AH]</td>
<td>3.0 cr</td>
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<tr>
<td>SCAN 5614</td>
<td>Blood on Snow: Scandinavian Thrillers in Fiction and Film</td>
<td>3.0 cr</td>
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<td>SCMC 5001</td>
<td>Critical Debates in the Study of Cinema and Media Culture</td>
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<tr>
<td>TH 8120</td>
<td>Seminar</td>
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</tbody>
</table>

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

- **Masters**
- **Doctoral**
Twin Cities Campus
Music D.M.A.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612- 624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 85 to 97
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Musical Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Doctor of Musical Arts (DMA) offers emphases in instrumental performance, piano, organ, voice, guitar, collaborative piano, and conducting.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy.

Master's degree in an appropriate field of study

Special Application Requirements:
Some emphases require additional application materials such as a preliminary DVD, audition, and/or interview. For more information, please refer to https://cla.umn.edu/music/graduate/apply.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
81 to 93 credits are required in the major.
4 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies according to emphasis

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All DMA students must complete at least one emphasis area.

Language requirement: A reading knowledge of French, German, Italian, or equivalent research tool is required for the Music DMA Conducting emphasis.

With the exception of courses outside of the School of Music, all coursework offered on both the A-F and S/N grade basis must be taken A-F.

Research Requirement (3 credits)
All students take the following course:

MUS 5611 - Resources for Music Research (3.0 cr)

Music Theory/Musicology Coursework (12 credits)
All students select 12 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.

MUS 5534 - Musical Minimalisms (3.0 cr)
MUS 5541 - 16th-Century Counterpoint (3.0 cr)
MUS 5550 - Class Composition for Performers (3.0 cr)
MUS 5561 - Orchestration I (3.0 cr)
MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
MUS 5572 - Chromatic Harmony (3.0 cr)
MUS 5591 - Introduction to Music Information Technology (3.0 cr)
MUS 5592 - Music Informatics Seminar (3.0 cr)
MUS 5620 - Topics in Opera History (3.0 cr)
MUS 5624 - Music of J. S. Bach (3.0 cr)
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
MUS 5647 - 20th-Century European/American Music (3.0 cr)
MUS 5731 - Jazz and Modernism (3.0 cr)
MUS 5805 - Worlds of Improvisation (3.0 cr)
MUS 5850 - Topics in Music (1.0 - 4.0 cr)
MUS 8501 - Music Theory Pedagogy (3.0 cr)
MUS 8550 - Composition (3.0 cr)
MUS 8560 - Readings in Music Theory (3.0 cr)
MUS 8570 - Seminar in Composition (2.0 cr)
MUS 8571 - Composers' Laboratory (3.0 cr)
MUS 8580 - Topics in Tonal Analysis (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
MUS 8640 - Seminar in Musicology (3.0 cr)
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)
MUS 8588 - Sonata Theory (3.0 cr)
MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

Electives (6-10 credits)
All students select at least 6-10 elective credits in consultation with the advisor. Collaborative Piano students must take 10 elective credits. MUS and MUED courses applied to other DMA credit requirements cannot also apply as an elective.

MUS 5xxx
MUS 8xxx
Recital and Ensemble Credits
Students pursuing a secondary area take a total of 12 credits (three 2-credit recitals plus 6 ensemble credits, or three 4-credit recitals).
Students not pursuing a secondary area take a total of 20 credits (five 2-credit recitals plus 10 ensemble credits, or five 4-credit recitals).

Recital Credits (6 to 20 credits)
Students pursuing a secondary area take either 6 or 12 recital credits. Students not pursuing a secondary area take either 10 or 20 recital credits. Recital credits are taken in consultation with the advisor.

MUS 5230 - Chorus (1.0 - 2.0 cr)
MUS 5240 - University Singers (1.0 cr)
MUS 5250 - Opera Workshop and Ensemble (2.0 cr)
MUS 5280 - Opera Theatre (2.0 cr)
MUS 5340 - Jazz Ensemble (1.0 cr)
MUS 5410 - University Wind Bands (1.0 cr)
MUS 5420 - Orchestra (1.0 cr)
MUS 5440 - Chamber Ensemble (1.0 cr)
MUS 5460 - World Music Ensemble (1.0 - 2.0 cr)
MUS 5490 - Percussion Ensemble (1.0 cr)
MUS 5494 - West African Music Ensemble (1.0 cr)

Ensemble Credits (0 to 10 credits)
Students pursuing a secondary area select 0 to 6 credits as needed to meet the 12-credit recital/ensemble requirement. Students not pursuing a secondary area select 0 to 10 credits to meet the 20-credit recital/ensemble requirement.

MUS 5230 - Chorus (1.0 - 2.0 cr)
MUS 5240 - University Singers (1.0 cr)
MUS 5250 - Opera Workshop and Ensemble (2.0 cr)
MUS 5280 - Opera Theatre (2.0 cr)
MUS 5340 - Jazz Ensemble (1.0 cr)
MUS 5410 - University Wind Bands (1.0 cr)
MUS 5420 - Orchestra (1.0 cr)
MUS 5440 - Chamber Ensemble (1.0 cr)
MUS 5460 - World Music Ensemble (1.0 - 2.0 cr)
MUS 5490 - Percussion Ensemble (1.0 cr)
MUS 5494 - West African Music Ensemble (1.0 cr)

Thesis Credits
All DMA students take 4 doctoral thesis credits.

MUS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Emphases

Instrumental Performance (40 credits)
The Instrumental Performance emphasis offers the following options: bassoon, cello, clarinet, double bass, flute, French horn, harp, oboe, percussion, saxophone, trombone, trumpet, tuba, viola, and violin.

Applied Lessons (32 credits)
Take 32 credits in consultation with the advisor. A maximum of 8 credits may be transferred in from an external Master's degree.

MUSA 8301 - Piano: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8304 - Voice: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8305 - Violin: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8306 - Viola: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8307 - Cello: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8308 - Double Bass: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8309 - Flute: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8311 - Oboe: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8312 - Clarinet: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8313 - Saxophone: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8314 - Bassoon: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8315 - French Horn: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8316 - Trumpet: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8317 - Trombone: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8318 - Euphonium: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8319 - Tuba: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8321 - Percussion: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8322 - Harp: Music Major (graduate) (2.0 - 4.0 cr)
MUSA 8324 - Accompanying/Coaching: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (8 credits)
Select 8 credits from the following in consultation with the advisor:

MUED 5750 - Topics in Music Education (1.0 - 4.0 cr)
MUED 5991 - Independent Study (1.0 - 4.0 cr)
MUED 8284 - Seminar: Research and Scholarly Issues (3.0 cr)
MUED 8994 - Directed Research (1.0 - 8.0 cr)
MUS 5331 - Jazz Improvisation I (2.0 cr)
MUS 5340 - Jazz Ensemble (1.0 cr)
MUS 5410 - University Wind Bands (1.0 cr)
MUS 5420 - Orchestra (1.0 cr)
MUS 5427 - Violin Pedagogy I (2.0 cr)
MUS 5440 - Chamber Ensemble (1.0 cr)
MUS 5450 - Orchestral Repertoire (1.0 - 3.0 cr)
MUS 5460 - World Music Ensemble (1.0 - 2.0 cr)
MUS 5464 - Cello Pedagogy (2.0 cr)
MUS 5490 - Percussion Ensemble (1.0 cr)
MUS 5491 - Percussion Literature I (2.0 cr)
MUS 5494 - West African Music Ensemble (1.0 cr)
MUS 5561 - Orchestration I (3.0 cr)
MUS 5993 - Directed Studies (1.0 - 4.0 cr)
MUS 8994 - Directed Research (1.0 - 3.0 cr)

-OR-

Organ (43 credits)
Applied Lessons (32 credits)
Take 32 credits of the following in consultation with the advisor. A maximum of 8 credits may be transferred in from an external Master's degree.
MUSA 8303 - Organ: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (11 credits)
Take the following courses:
MUS 5151 - Organ Literature I (3.0 cr)
MUS 5152 - Organ Literature II (3.0 cr)
MUS 8131 - Advanced Keyboard Skills (2.0 cr)
MUS 8133 - Seminar in Basso Continuo (3.0 cr)

-OR-

Piano (44 credits)
Applied Lessons (32 credits)
A maximum of 8 credits may be transferred in from an external Master's degree.
MUSA 8301 - Piano: Music Major (graduate) (2.0 - 4.0 cr)

Required Coursework (6 credits)
Take the following courses:
MUS 5181 - Advanced Piano Literature I (2.0 cr)
MUS 5182 - Advanced Piano Literature II (2.0 cr)
MUS 8131 - Advanced Keyboard Skills (2.0 cr)

Emphasis Electives (6 credits)
Select 6 credits from the following in consultation with the advisor:
MUS 5101 - Piano Pedagogy I (2.0 cr)
MUS 5331 - Jazz Improvisation I (2.0 cr)
MUS 5340 - Jazz Ensemble (1.0 cr)
MUS 5410 - University Wind Bands (1.0 cr)
MUS 5420 - Orchestra (1.0 cr)
MUS 5440 - Chamber Ensemble (1.0 cr)
MUS 5450 - Orchestral Repertoire (1.0 - 3.0 cr)
MUS 5460 - World Music Ensemble (1.0 - 2.0 cr)
MUS 5494 - West African Music Ensemble (1.0 cr)
MUS 5561 - Orchestration I (3.0 cr)
MUS 5993 - Directed Studies (1.0 - 4.0 cr)
MUS 8994 - Directed Research (1.0 - 3.0 cr)

-OR-

Guitar (40 credits)
Applied Lessons (32 credits)
Take 32 credits of the following in consultation with the advisor. A maximum of 8 credits may be transferred in from an external Master's degree.
MUSA 8323 - Guitar: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (8 credits)
Take the following courses and 4 additional credits in consultation with the advisor:
MUS 5461 - Guitar Literature (2.0 cr)
MUS 5466 - Guitar Pedagogy (2.0 cr)

-OR-

Voice (44 credits)

Applied Lessons (32 credits)
Take 32 credits of the following in consultation with the advisor. A maximum of 8 credits maybe be transferred in from an external Master's degree.
MUSA 8304 - Voice: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor:
MUS 5271 - Diction for Singers I (2.0 cr)
MUS 5272 - Diction for Singers II (2.0 cr)
MUS 5275 - Vocal Pedagogy I (3.0 cr)
MUS 5276 - Vocal Pedagogy II (3.0 cr)
MUS 5241 - Vocal Literature I (3.0 cr)
MUS 8182 - Opera History in Context: Monteverdi and Mozart (3.0 cr)
MUS 8183 - Opera History in Context: Verdi and Britten (3.0 cr)

-OR-

Collaborative Piano (41 credits)

Applied Lessons (32 credits)
Take 32 credits of the following in consultation with the advisor:
MUSA 8324 - Accompanying/Coaching: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (9 credits)
Take the following courses and 4 additional units in consultation with the advisor.
MUS 5241 - Vocal Literature I (3.0 cr)
MUS 5271 - Diction for Singers I (2.0 cr)
MUS 8110 - Sonata Seminar (2.0 cr)
MUS 8131 - Advanced Keyboard Skills (2.0 cr)

-OR-

Conducting (40 credits)

Required Coursework (28 credits)
Take 28 credits of the following, in consultation with the advisor, as follows: 20 credits in the primary area; 4 credits in a secondary area; and 4 credits in a tertiary area.
MUS 8450 - Graduate Seminar in Conducting (3.0 - 4.0 cr)

Emphasis electives (12 credits)
Select 12 electives credits in consultation with the advisor. A minimum of 8 credits must be taken in Performance/Pedagogy. May include studio voice or instrumental study, music education courses, pedagogy related courses, diction classes, or repertoire courses.
MUS 5xxx

-OR-

Secondary Area - Musicology/Ethnomusicology (0 to 15 credits)
Division approval to participate in a secondary area is required.

Required Course (3 credits)
Take the following course:
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)

Musicology/Ethnomusicology Electives (12 credits)
Select 12 credits of MUS 56xx- or 86xx-level courses in consultation with the advisor. At least 6 credits must be at the 8000-level. Other courses may be approved in consultation with your advisor.

-OR-

Secondary Area - Music Theory (0 to 15 credits)
Division approval to participate in a secondary area is required.

Schenkerian Theory Course (3 credits)
Select one of the following courses in consultation with the advisor:
MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)

Music Theory Coursework (12 credits)
Select 12 credits of MUS 55xx- or 85xx-level courses in consultation with the advisor. At least 6 credits must be at the 8000-level. Other courses may be approved in consultation with your advisor.

-OR-

Secondary Area - Music Composition (0 to 15 credits)
Division approval to participate in a secondary area is required.
Composition Courses (6 credits)
Take the following twice for a total of 6 credits:

- MUS 8550 - Composition (3.0 cr)

Emphasis Electives (9 credits)
Select 9 credits from the following in consultation with the advisor:

- MUS 5591 - Introduction to Music Information Technology (3.0 cr)
- MUS 5950 - Topics in Music (1.0 - 4.0 cr)
- MUS 5993 - Directed Studies (1.0 - 4.0 cr)
- MUS 8994 - Directed Research (1.0 - 3.0 cr)

-OR-

Secondary Area - Choral Conducting (0 to 15 credits)
Division approval to participate in a secondary area is required. In addition to the following courses, Choral Conducting requires a conducting recital, lecture presentation, and concert program with detailed program notes.

Required Coursework (15 credits)
Take the following courses. Take MUS 8450 for 3 credits twice for a total of 6 credits.

- MUS 8237 - Score Study: Choral (3.0 cr)
- MUS 8255 - Choral Literature: Baroque Era to the Present (3.0 cr)
- MUS 8299 - Performance in Choral Conducting (3.0 cr)
- MUS 8450 - Graduate Seminar in Conducting (3.0 - 4.0 cr)

-OR-

Secondary Area - Education/Pedagogy (0 to 15 credits)
Division approval to participate in a secondary area is required. No courses applied to the Education/Pedagogy secondary area may also be used to complete the DMAs 6-credit elective requirement.

Required Courses (6 credits)
Take the following courses:

- MUED 8280 - Seminar: Current Trends in Music Education (3.0 cr)
- MUED 8284 - Seminar: Research and Scholarly Issues (3.0 cr)

Education/Pedagogy Course (3 credits)
Select 3 credits from the following in consultation with the advisor:

- MUED 5xxx
- MUED 8xxx

Elective Courses (6 credits)
Select 6 credits from the following in consultation with the advisor:

- MUS 5101 - Piano Pedagogy I (2.0 cr)
- MUS 5275 - Vocal Pedagogy I (3.0 cr)
- MUS 5427 - Violin Pedagogy I (2.0 cr)
- MUS 5464 - Cello Pedagogy (2.0 cr)
- MUS 5466 - Guitar Pedagogy (2.0 cr)
- MUS 5481 - Trumpet Pedagogy (2.0 cr)
- MUS 8501 - Music Theory Pedagogy (3.0 cr)
Twin Cities Campus
Music Education Post-Baccalaureate Licensure Certificate
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Music Admissions
200 Ferguson Hall
2106 4th St S,
Minneapolis, MN 55455
Phone: 612-624-5740
Email: mnmusic@umn.edu
Website: http://music.umn.edu

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 42 to 46
• This program does not require summer semesters for timely completion.
• Degree: Music Education Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This post-baccalaureate certificate has two emphases that align with state teacher education requirements: K-12 Instrumental/General Music and K-12 Vocal/General Music. The certificate enables students with previous performance degrees to complete the required curriculum for licensure to teach music in K-12 settings in the state of Minnesota.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A music degree from an accredited college or university.

Other requirements to be completed before admission:
  Music Theory/Aural Skills sequence  4 semesters
  Music History sequence  2 semesters of Western Art Music History from Renaissance to present & 1 semester of music history focused on genres beyond Western Art Music
  Applied Music 7 semesters of intensive applied study on an instrument
  Ensembles 7 semesters, including at least 4 large ensembles appropriate to emphasis:
    Wind Ensemble, Orchestra, or Symphonic band
    Basic Conducting, One semester of basic conducting
    Chorus or University Singers

Prerequisite courses:
Equivalent prerequisites, as determined by the certificate program, are accepted.
  All students: Music Ed 1201 (2 credits)
  Instrumental Emphasis: MUS 1260 (2 credits) or MUSA 1404 (2-4 credits)
  Vocal Emphasis (Piano or Voice): MUSA 1404 (2-4 credits) or MUSA 1401 (2-4 credits)

A minimum grade of C for each course is required.

Special Application Requirements:
  2 letters of recommendation
  30 hours of field experience in a K-12 setting
  Performance DVD on primary instrument
Successful completion of the Proficiency Exam for Music Education
Written Skills
Oral Skills
Accompanying Skills
Song-Leading Skills
Error-Detection Skills

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses offered on both the A/F and S/N grading basis must be taken A/F.

Professional Education Coursework (10 credits)
Take the following courses. CI 5452 must be taken for 2 credits.
CI 4602 - English Learners and Academic Language (1.0 cr)
CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
EPSY 4001 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
OLPD 5005 - School and Society (2.0 cr)
OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)

Music Education Core (15 credits)
Take the following courses. MUED 5350 must be taken for 5 credits.
MUED 5101 - Improvisation and Creativity in the Music Classroom (2.0 cr)
MUED 5301 - General Music I (3.0 cr)
MUED 5302 - General Music II (3.0 cr)
MUED 5350 - Student Teaching in Classroom Music (4.0 - 8.0 cr)
MUED 5650 - Student Teaching Seminar (2.0 cr)

Emphasis Options

Instrumental Emphasis (21 credits)
Take the following courses. MUED 5550 must be taken for 5 credits.
MUED 4502 - String Techniques and Teaching (2.0 cr)
MUED 4503 - Woodwind Techniques and Teaching (2.0 cr)
MUED 4504 - Brass Techniques and Teaching (2.0 cr)
MUED 4505 - Percussion Techniques and Teaching (2.0 cr)
MUED 5516 - Instrumental Methods and Materials I (3.0 cr)
MUED 5517 - Instrumental Methods and Materials II (3.0 cr)
MUED 5519 - Advanced Conducting and Repertoire (Instrumental) (2.0 cr)
MUED 5550 - Student Teaching in Instrumental Music (4.0 - 8.0 cr)

-OR-

Vocal Emphasis -- Piano or Voice (17 credits)
Take the following courses. MUED 5450 must be taken for 5 credits.
MUED 4417 - Style, Pedagogy, and Diction in the Choral Music Classroom I (2.0 cr)
MUED 4418 - Style, Pedagogy, and Diction in the Choral Music Classroom II (2.0 cr)
MUED 5415 - Choral/Vocal Methods and Materials I (3.0 cr)
MUED 5416 - Choral/Vocal Methods and Materials II (3.0 cr)
MUED 5419 - Advanced Conducting and Repertoire (Choral) (2.0 cr)
MUED 5450 - Student Teaching in Vocal Music (4.0 - 8.0 cr)
Twin Cities Campus
Music M.A.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers a Music MA degree with emphases in composition, music therapy, musicology/ethnomusicology, and theory.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: composition, music therapy, musicology/ethnomusicology, performance, or theory.

Special Application Requirements:
Composition emphasis: submission of original scores and recordings (2-4 scores of varying genres)

Music Therapy emphasis: documentation of at least 3,500 hours of clinical experience, and completion of prerequisite coursework. Applicants without the following prerequisites must complete all of the following upon admission. Prerequisite coursework does not count toward the 30 credits required for the MA degree.
MUED 3802 - Guitar I for Music Education and Music Therapy Majors: Developing Group Songleading Skills (2.0 cr)
MUED 3803 - Guitar II for Music Education and Music Therapy Majors: Developing Group Songleading Skills (2.0 cr)
MUED 5803 - Therapeutic Management in Music Settings (4.0 cr)
MUED 5804 - Music Therapy Methods and Procedures I (4.0 cr)
MUED 5805 - Music Therapy Methods and Procedures II (4.0 cr)
MUED 5806 - Career Preparation (4.0 cr)
MUED 5855 - Music Therapy Internship (1.0-13.0 cr)

Musicology/ethnomusicology emphasis: submission of one or more original papers, at least one of which demonstrates ability in musical analysis

Theory emphasis: submission of one original paper on tonal analysis, and one original paper on post-tonal analysis

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB

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Information current as of November 07, 2022
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 24 to 29 major credits and 3 to 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies according to emphasis

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Language requirements: A reading knowledge of French, German, or Italian is required for all MA degree emphases except therapy. For the emphasis in composition, reading knowledge of a foreign language or, with approval, an equivalent research tool.

All coursework offered on both the A-F and S/N grade basis must be taken A-F.

**Concentrations**

**Composition (32 credits)**

Students pursuing the Composition emphasis complete the Plan B option.

**Required Course (3 credits)**

Take the following course:

- **MUS 5591** - Introduction to Music Information Technology (3.0 cr)

**Composition Coursework (12 credits)**

Take MUS 8550 4 times for a total of 12 credits.

- **MUS 8550** - Composition (3.0 cr)

**Theory and/or Analysis Coursework (3 credits)**

Select 3 credits from the following in consultation with the advisor:

- MUS 85xx

**Musicology/Ethnomusicology Coursework (3 credits)**

Select 3 credits from the following in consultation with the advisor:

- MUS 56xx
- MUS 58xx
- MUS 86xx
- MUS 88xx

**Ensemble (2 credits)**

Select 2 credits from the following in consultation with the advisor:

- **MUS 5240** - University Singers (1.0 cr)
- **MUS 5280** - Opera Theatre (2.0 cr)
- **MUS 5340** - Jazz Ensemble (1.0 cr)
- **MUS 5410** - University Wind Bands (1.0 cr)
- **MUS 5420** - Orchestra (1.0 cr)
- **MUS 5440** - Chamber Ensemble (1.0 cr)
- **MUS 5460** - World Music Ensemble (1.0 - 2.0 cr)
- **MUS 5490** - Percussion Ensemble (1.0 cr)
- **MUS 5493** - Javanese Gamelan Music Ensemble (1.0 cr)
- **MUS 5494** - West African Music Ensemble (1.0 cr)

**Creative Studies and Media (6 credits)**

Select 6 credits from the following in consultation with the advisor:

- MUS 5xxx
- MUS 8xxx
Outside Coursework (3 credits)
Select 3 credits outside the major in consultation with the advisor. MUED and Music Therapy courses can be included with advisor approval.
MUED 5xxx
MUED 8xxx

-MUED 5xxx

Music Therapy (30 credits)
Students pursuing the Music Therapy emphasis complete the Plan B option.

Music Therapy Coursework (13 credits)
Take the following courses in consultation with the advisor. At least one of the courses must be taken for 4 credits.
MUED 5807 - Psychiatric Music Therapy (3.0 - 4.0 cr)
MUED 5808 - Medical Music Therapy (3.0 - 4.0 cr)
MUED 8809 - Advanced Music Therapy Competencies (3.0 - 4.0 cr)
MUED 8810 - Music Therapy Research (3.0 - 4.0 cr)

Research Core Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor:
MUED 8112 - Introduction to Research Methods and Design in Arts Education (3.0 cr)
MUED 8115 - Assessment in Arts Education (3.0 cr)
MUED 8118 - Qualitative Research in Arts Education (3.0 cr)

Electives (6 credits)
Select 6 credits from the following in consultation with the advisor:
MUS 55xx
MUS 56xx
MUS 57xx
MUS 58xx
MUS 85xx
MUS 86xx
MUS 87xx
MUS 88xx

Research Project (5 credits)
Take 5 credits of the following in consultation with the advisor:
MUED 8880 - Master's Research Project (3.0 - 6.0 cr)

-MUED 8880

Musicology/Ethnomusicology (30 to 34 credits)
Students pursuing the Musicology/Ethnomusicology emphasis can complete either the Plan A (34 credits) or Plan B (30 credits) option.

Required Coursework (9 credits)
Take the following courses. Select the additional MUS 86xx course in consultation with the advisor.
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8864 - Seminar: Advanced Research in Ethnomusicology (3.0 cr)
MUS 86xx - Musicology Course (3.0 cr)

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor. MUED and Music Therapy courses can be included with advisor approval.
MUED 5xxx
MUED 8xxx

Plan Options
Plan A
Electives (9 credits)
Select 9 credits from the following in consultation with the advisor:
MUS 56xx
MUS 86xx
MUS 58xx
MUS 88xx

Thesis Credits
Take 10 master's thesis credits.
MUS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B
Electives (15 credits)
Select 15 credits from the following in consultation with the advisor:
MUS 56xx
MUS 86xx
MUS 58xx
MUS 88xx
Theory (30 credits)
Students pursuing the Theory emphasis must complete the Plan B option.

Music Theory/Analysis Coursework (18 credits)
Select 18 credit from the following in consultation with the advisor:
MUS 85xx

Musicology/Ethnomusicology (3 credits)
Select 3 credits from the following in consultation with the advisor:
MUS 86xx
MUS 88xx

Electives (3 credits)
Select 3 credits from the following in consultation with the advisor:
MUS 5xxx
MUS 8xxx
MUSA 5xxx
MUSA 8xxx

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor. MUED and Music Therapy courses can be included with advisor approval.
ACL 5221 - Creative Entrepreneurship and Resource Development (3.0 cr)
ESL 5302 - Academic Writing (4.0 cr)
GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
MUED 5xxx
MUED 8xxx
MUS 5xxx
MUS 8xxx
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)
Twin Cities Campus
Music M.M.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 37
- This program does not require summer semesters for timely completion.
- Degree: Master of Music

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of music degree offers emphases in piano, organ, voice, violin, viola, cello, double bass, flute, oboe, clarinet, saxophone, bassoon, French horn, trumpet, trombone, euphonium, tuba, percussion, harp, guitar, collaborative piano/coaching, orchestral conducting, wind ensemble/band conducting, and choral conducting.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Some emphases require additional application materials such as a preliminary DVD, audition, and/or interview. For more information, please refer to https://cla.umn.edu/music/graduate/apply.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 to 37 major credits and up to null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies according to emphasis
A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Language requirements: A reading knowledge of French, German, Italian, or equivalent research tool is required for the following Music MM areas of emphasis - Choral Conducting, Orchestral Conducting, and Wind Ensemble/Band Conducting.

With the exception of coursework taken outside the School of Music, all courses offered on both the A-F and S/N grade basis must be taken A-F.

**Emphases**

**Instrumental Performance (34 credits)**

**Applied Lessons (16 credits)**

Take 16 credits in consultation with the advisor.

- **MUSA 8301** - Piano: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8304** - Voice: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8305** - Violin: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8306** - Viola: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8307** - Cello: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8308** - Double Bass: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8309** - Flute: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8311** - Oboe: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8312** - Clarinet: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8313** - Saxophone: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8314** - Bassoon: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8315** - French Horn: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8316** - Trumpet: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8317** - Trombone: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8318** - Euphonium: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8319** - Tubas: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8321** - Percussion: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8322** - Harp: Music Major (graduate) (2.0 - 4.0 cr)
- **MUSA 8324** - Accompanying/Coaching: Music Major (graduate) (2.0 - 4.0 cr)

**Emphasis Coursework (4 credits)**

Select 4 credits from the following in consultation with the advisor and director of graduate studies:

- **MUED 5750** - Topics in Music Education (1.0 - 4.0 cr)
- **MUED 5991** - Independent Study (1.0 - 4.0 cr)
- **MUED 8284** - Seminar: Research and Scholarly Issues (3.0 cr)
- **MUED 8994** - Directed Research (1.0 - 8.0 cr)
- **MUS 5331** - Jazz Improvisation I (2.0 cr)
- **MUS 5340** - Jazz Ensemble (1.0 cr)
- **MUS 5427** - Violin Pedagogy I (2.0 cr)
- **MUS 5440** - Chamber Ensemble (1.0 cr)
- **MUS 5450** - Orchestral Repertoire (1.0 - 3.0 cr)
- **MUS 5460** - World Music Ensemble (1.0 - 2.0 cr)
- **MUS 5464** - Cello Pedagogy (2.0 cr)
- **MUS 5490** - Percussion Ensemble (1.0 cr)
- **MUS 5491** - Percussion Literature I (2.0 cr)
- **MUS 5494** - West African Music Ensemble (1.0 cr)
- **MUS 5561** - Orchestration I (3.0 cr)
- **MUS 5993** - Directed Studies (1.0 - 4.0 cr)
- **MUED 8994** - Directed Research (1.0 - 3.0 cr)

**Ensemble (3 credits)**

Take 3 credits of the following in consultation with the advisor:

- **MUS 5410** - University Wind Bands (1.0 cr)
- **MUS 5420** - Orchestra (1.0 cr)

**Music Theory/Musicology Coursework (9 credits)**

Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.

- **MUS 5534** - Musical Minimalisms (3.0 cr)
- **MUS 5550** - Class Composition for Performers (3.0 cr)
- **MUS 5571** - Schenkerian Analysis for Performers (3.0 cr)
- **MUS 5572** - Chromatic Harmony (3.0 cr)
- **MUS 5591** - Introduction to Music Information Technology (3.0 cr)
- **MUS 5592** - Music Informatics Seminar (3.0 cr)
MUS 5620 - Topics in Opera History (3.0 cr)
MUS 5624 - Music of J. S. Bach (3.0 cr)
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
MUS 5647 - 20th-Century European/American Music (3.0 cr)
MUS 5731 - Jazz and Modernism (3.0 cr)
MUS 5805 - Worlds of Improvisation (3.0 cr)
MUS 5950 - Topics in Music (1.0 - 4.0 cr)
MUS 8501 - Music Theory Pedagogy (3.0 cr)
MUS 8550 - Composition (3.0 cr)
MUS 8560 - Readings in Music Theory (3.0 cr)
MUS 8570 - Seminar in Composition (2.0 cr)
MUS 8571 - Composers' Laboratory (3.0 cr)
MUS 8580 - Topics in Tonal Analysis (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
MUS 8640 - Seminar in Musicology (3.0 cr)
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)
MUS 8588 - Sonata Theory (3.0 cr)
MUS 8586 - Current Issues in Ethnomusicology (3.0 cr)

Electives (2 credits)
Select 2 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with approval of the advisor and director of graduate studies.

ACL 5211 - Trends and Impacts in Arts and Cultural Leadership and Management (3.0 cr)
ACL 5221 - Creative Entrepreneurship and Resource Development (3.0 cr)
ESL 5302 - Academic Writing (4.0 cr)
GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
MUED 5xxx
MUED 8xxx
MUS 5xxx
MUS 8xxx
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)

-OR-

Organ (35 credits)

Applied Lessons (16 credits)
Take 16 credits of the following in consultation with the advisor:
MUSA 8303 - Organ: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (8 credits)
Take the following courses:
MUS 5151 - Organ Literature I (3.0 cr)
MUS 5152 - Organ Literature II (3.0 cr)
MUS 8131 - Advanced Keyboard Skills (2.0 cr)

Ensemble (2 credits)
Take ensemble credits concurrently with applied lesson registration, and in consultation with the advisor.
MUS 5240 - University Singers (1.0 cr)
MUS 5280 - Opera Theatre (2.0 cr)
MUS 5340 - Jazz Ensemble (1.0 cr)
MUS 5410 - University Wind Bands (1.0 cr)
MUS 5420 - Orchestra (1.0 cr)
MUS 5440 - Chamber Ensemble (1.0 cr)
MUS 5460 - World Music Ensemble (1.0 - 2.0 cr)
MUS 5490 - Percussion Ensemble (1.0 cr)
MUS 5493 - Javanese Gamelan Music Ensemble (1.0 cr)
MUS 5494 - West African Music Ensemble (1.0 cr)

Music Theory/Musicology Coursework (9 credits)
Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.
MUS 5534 - Musical Minimalisms (3.0 cr)
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
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<tr>
<td>MUS 8588</td>
<td>Sonata Theory</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8864</td>
<td>Current Issues in Ethnomusicology</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Piano (34 Credits)**

**Applied Lessons (16 credits)**
Take 16 credits of the following in consultation with the advisor:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSA 8301</td>
<td>Piano: Music Major (graduate)</td>
<td>2.0 - 4.0 cr</td>
</tr>
</tbody>
</table>

**Emphasis Coursework (4 credits)**

Take the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 5181</td>
<td>Advanced Piano Literature I</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MUS 5182</td>
<td>Advanced Piano Literature II</td>
<td>2.0 cr</td>
</tr>
</tbody>
</table>

**Emphasis coursework choice (4 credits)**
Select 4 credits from the following in consultation with the advisor:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 5101</td>
<td>Piano Pedagogy I</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MUS 8131</td>
<td>Advanced Keyboard Skills</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MUSA 8324</td>
<td>Accompanying/Coaching: Music Major (graduate)</td>
<td>2.0 - 4.0 cr</td>
</tr>
</tbody>
</table>

**Ensemble (1 credit)**
Select from the following in consultation with the advisor:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 5240</td>
<td>University Singers</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5280</td>
<td>Opera Theatre</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MUS 5340</td>
<td>Jazz Ensemble</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5410</td>
<td>University Wind Bands</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5420</td>
<td>Orchestra</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5440</td>
<td>Chamber Ensemble</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5460</td>
<td>World Music Ensemble</td>
<td>1.0 - 2.0 cr</td>
</tr>
<tr>
<td>MUS 5490</td>
<td>Percussion Ensemble</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5493</td>
<td>Javanese Gamelan Music Ensemble</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>MUS 5494</td>
<td>West African Music Ensemble</td>
<td>1.0 cr</td>
</tr>
</tbody>
</table>

**Music Theory/Musicology Coursework (9 credits)**
Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 5534</td>
<td>Musical Minimalisms</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5550</td>
<td>Class Composition for Performers</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5561</td>
<td>Orchestration I</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5571</td>
<td>Schenkerian Analysis for Performers</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5572</td>
<td>Chromatic Harmony</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 5591</td>
<td>Introduction to Music Information Technology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5592</td>
<td>Music Informatics Seminar</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5620</td>
<td>Topics in Opera History</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5624</td>
<td>Music of J. S. Bach</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5630</td>
<td>Performance Practice: 1700 to the Present</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5631</td>
<td>Beethoven Sonatas for Solo Piano, Violin, &amp; Cello</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5647</td>
<td>20th-Century European/American Music</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5731</td>
<td>Jazz and Modernism</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5805</td>
<td>Worlds of Improvisation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 5950</td>
<td>Topics in Music (1.0 - 4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>MUS 8501</td>
<td>Music Theory Pedagogy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8550</td>
<td>Composition</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8560</td>
<td>Readings in Music Theory</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8570</td>
<td>Seminar in Composition</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MUS 8580</td>
<td>Topics in Tonal Analysis</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8581</td>
<td>Schenkerian Theory and Analysis I</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8582</td>
<td>Schenkerian Theory and Analysis II</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8584</td>
<td>Current Issues in the Analysis of 19th-Century Music</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8585</td>
<td>Chromatic Harmony Seminar</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8590</td>
<td>Topics in 20th-Century Analysis</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8631</td>
<td>Seminar: Music in Medieval Europe</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8632</td>
<td>Seminar: Music in Early Modern Europe</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8640</td>
<td>Seminar in Musicology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8644</td>
<td>Seminar: Advanced Research in Historical Musicology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8647</td>
<td>Seminar: The Critical Editing of Early Music--Method and Practice</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8588</td>
<td>Sonata Theory</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MUS 8664</td>
<td>Current Issues in Ethnomusicology</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Guitar (35 credits)**

**Applied Lessons (16 credits)**
- Take 16 credits of the following in consultation with the advisor:
  - MUSA 8323 - Guitar: Music Major (graduate) (2.0 - 4.0 cr)

**Emphasis Coursework (2 credits)**
- Select one of the following courses in consultation with the advisor:
  - MUS 5461 - Guitar Literature (2.0 cr)
  - MUS 5466 - Guitar Pedagogy (2.0 cr)

**Ensemble (2 credits)**
- Select credits in consultation with the advisor.
  - MUS 54xx (2.0 cr)

**Music Theory/Musicology (9 credits)**
- Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.
  - MUS 5534 - Musical Minimalisms (3.0 cr)
  - MUS 5550 - Class Composition for Performers (3.0 cr)
  - MUS 5561 - Orchestration I (3.0 cr)
  - MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
  - MUS 5572 - Chromatic Harmony (3.0 cr)
  - MUS 5591 - Introduction to Music Information Technology (3.0 cr)
  - MUS 5592 - Music Informatics Seminar (3.0 cr)
  - MUS 5620 - Topics in Opera History (3.0 cr)
  - MUS 5624 - Music of J. S. Bach (3.0 cr)
  - MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
  - MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
  - MUS 5647 - 20th-Century European/American Music (3.0 cr)
  - MUS 5731 - Jazz and Modernism (3.0 cr)
  - MUS 5805 - Worlds of Improvisation (3.0 cr)
  - MUS 5950 - Topics in Music (1.0 - 4.0 cr)
  - MUS 8501 - Music Theory Pedagogy (3.0 cr)
  - MUS 8550 - Composition (3.0 cr)
  - MUS 8560 - Readings in Music Theory (3.0 cr)
  - MUS 8570 - Seminar in Composition (2.0 cr)
  - MUS 8571 - Composers' Laboratory (3.0 cr)
  - MUS 8580 - Topics in Tonal Analysis (3.0 cr)
  - MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
  - MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
  - MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
MUS 8640 - Seminar in Musicology (3.0 cr)
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music—Method and Practice (3.0 cr)
MUS 8588 - Sonata Theory (3.0 cr)
MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with approval of the advisor and director of graduate studies.
ACL 5211 - Trends and Impacts in Arts and Cultural Leadership and Management (3.0 cr)
ACL 5221 - Creative Entrepreneurship and Resource Development (3.0 cr)
GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
MUED 5xxx
MUED 8xxx
MUS 5xxx
MUS 8xxx
WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

Voice (37 credits)

Applied Lessons (16 credits)
Take 16 credits of the following in consultation with the advisor.
MUSA 8504 - Voice: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (10 credits)
Select 10 credits from the following courses in the area of diction, vocal pedagogy, and vocal literature or other courses in opera history or vocal literature offered by members of the voice division and the Director of Opera Theatre in consultation with the advisor:
MUS 5241 - Vocal Literature I (3.0 cr)
MUS 5271 - Diction for Singers I (2.0 cr)
MUS 5272 - Diction for Singers II (2.0 cr)
MUS 5275 - Vocal Pedagogy I (3.0 cr)
MUS 5276 - Vocal Pedagogy II (3.0 cr)
MUS 8182 - Opera History in Context: Monteverdi and Mozart (3.0 cr)
MUS 8183 - Opera History in Context: Verdi and Britten (3.0 cr)

Ensemble (2 credits)
Select from the following in consultation with the advisor:
MUS 8230 - Chorus (1.0 - 2.0 cr)
MUS 8240 - University Singers (1.0 cr)
MUS 8250 - Opera Workshop and Ensemble (2.0 cr)
MUS 8280 - Opera Theatre (2.0 cr)

Music Theory/Musicology Coursework (9 credits)
Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.
MUS 5534 - Musical Minimalisms (3.0 cr)
MUS 5550 - Class Composition for Performers (3.0 cr)
MUS 5561 - Orchestration I (3.0 cr)
MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
MUS 5572 - Chromatic Harmony (3.0 cr)
MUS 5591 - Introduction to Music Information Technology (3.0 cr)
MUS 5592 - Music Informatics Seminar (3.0 cr)
MUS 5620 - Topics in Opera History (3.0 cr)
MUS 5624 - Music of J. S. Bach (3.0 cr)
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
MUS 5647 - 20th-Century European/American Music (3.0 cr)
MUS 5731 - Jazz and Modernism (3.0 cr)
MUS 5805 - Worlds of Improvisation (3.0 cr)
MUS 5950 - Topics in Music (1.0 - 4.0 cr)
MUS 8501 - Music Theory Pedagogy (3.0 cr)
MUS 8550 - Composition (3.0 cr)
MUS 8560 - Readings in Music Theory (3.0 cr)
MUS 8570 - Seminar in Composition (2.0 cr)
MUS 8571 - Composers' Laboratory (3.0 cr)

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MUS 8580 - Topics in Tonal Analysis (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
MUS 8640 - Seminar in Musicology (3.0 cr)
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)
MUS 8588 - Sonata Theory (3.0 cr)
MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

-OR-

Collaborative Piano (31 credits)
Applied Lessons (16 credits)
Take 16 credits of the following in consultation with the advisor:
MUSA 8324 - Accompanying/Coaching: Music Major (graduate) (2.0 - 4.0 cr)

Emphasis Coursework (6 credits)
Take the following courses:
MUS 5271 - Diction for Singers I (2.0 cr)
MUS 8110 - Sonata Seminar (2.0 cr)
MUS 8131 - Advanced Keyboard Skills (2.0 cr)

Music Theory/Musicology Coursework (9 credits)
Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.
MUS 5534 - Musical Minimalisms (3.0 cr)
MUS 5550 - Class Composition for Performers (3.0 cr)
MUS 5561 - Orchestration I (3.0 cr)
MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
MUS 5572 - Chromatic Harmony (3.0 cr)
MUS 5591 - Introduction to Music Information Technology (3.0 cr)
MUS 5592 - Music Informatics Seminar (3.0 cr)
MUS 5620 - Topics in Opera History (3.0 cr)
MUS 5624 - Music of J. S. Bach (3.0 cr)
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
MUS 5647 - 20th-Century European/American Music (3.0 cr)
MUS 5731 - Jazz and Modernism (3.0 cr)
MUS 5950 - Topics in Music (1.0 - 4.0 cr)
MUS 8501 - Music Theory Pedagogy (3.0 cr)
MUS 8550 - Composition (3.0 cr)
MUS 8560 - Readings in Music Theory (3.0 cr)
MUS 8570 - Seminar in Composition (2.0 cr)
MUS 8571 - Composers’ Laboratory (3.0 cr)
MUS 8580 - Topics in Tonal Analysis (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
MUS 8640 - Seminar in Musicology (3.0 cr)
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)
MUS 8588 - Sonata Theory (3.0 cr)
MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

-OR-

Choral Conducting (30 credits)
Required Coursework (15 credits)
Take the following courses. Take 6 credits of MUS 8450 in consultation with the advisor.
MUS 8237 - Score Study: Choral (3.0 cr)
MUS 8255 - Choral Literature: Baroque Era to the Present (3.0 cr)
MUS 8299 - Performance in Choral Conducting (3.0 cr)
MUS 8450 - Graduate Seminar in Conducting (3.0 - 4.0 cr)

Music Theory/Musicology Coursework (9 credits)
Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.

- MUS 5534 - Musical Minimalisms (3.0 cr)
- MUS 5550 - Class Composition for Performers (3.0 cr)
- MUS 5561 - Orchestration I (3.0 cr)
- MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
- MUS 5572 - Chromatic Harmony (3.0 cr)
- MUS 5591 - Introduction to Music Information Technology (3.0 cr)
- MUS 5592 - Music Informatics Seminar (3.0 cr)
- MUS 5620 - Topics in Opera History (3.0 cr)
- MUS 5624 - Music of J. S. Bach (3.0 cr)
- MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
- MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
- MUS 5647 - 20th-Century European/American Music (3.0 cr)
- MUS 5731 - Jazz and Modernism (3.0 cr)
- MUS 5805 - Worlds of Improvisation (3.0 cr)
- MUS 5950 - Topics in Music (1.0 - 4.0 cr)
- MUS 8051 - Music Theory Pedagogy (3.0 cr)
- MUS 8550 - Composition (3.0 cr)
- MUS 8560 - Readings in Music Theory (3.0 cr)
- MUS 8570 - Seminar in Composition (2.0 cr)
- MUS 8571 - Composers' Laboratory (3.0 cr)
- MUS 8580 - Topics in Tonal Analysis (3.0 cr)
- MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
- MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
- MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
- MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
- MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
- MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
- MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
- MUS 8640 - Seminar in Musicology (3.0 cr)
- MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
- MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)
- MUS 8648 - Sonata Theory (3.0 cr)
- MUS 8664 - Current Issues in Ethnomusicology (3.0 cr)

Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with approval of the advisor and director of graduate studies.

- ACL 5211 - Trends and Impacts in Arts and Cultural Leadership and Management (3.0 cr)
- ACL 5221 - Creative Entrepreneurship and Resource Development (3.0 cr)
- ESL 5302 - Academic Writing (4.0 cr)
- GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- MUS 5xxx
- MUS 8xxx
- MUSA 5xxx
- MUSA 8xxx
- WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
- WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

-OR-

Orchestrational Conducting (30 credits)

Required Coursework (6 credits)
Take 6 credits of the following:
- MUS 5561 - Orchestration I (3.0 cr)
- MUS 8489 - Performance and Document: Orchestral Conducting (3.0 cr)

Emphasis Coursework (12 credits)
Take 12 credits of the following in consultation with the advisor:
- MUS 8450 - Graduate Seminar in Conducting (3.0 - 4.0 cr)

Music Theory/Musicology Coursework (9 credits)
Select 9 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.

- MUS 5534 - Musical Minimalisms (3.0 cr)
- MUS 5550 - Class Composition for Performers (3.0 cr)
- MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)

MUS 5572 - Chromatic Harmony (3.0 cr)
MUS 5591 - Introduction to Music Information Technology (3.0 cr)
MUS 5592 - Music Informatics Seminar (3.0 cr)
MUS 5620 - Topics in Opera History (3.0 cr)
MUS 5624 - Music of J. S. Bach (3.0 cr)
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
MUS 5647 - 20th-Century European/American Music (3.0 cr)
MUS 5731 - Jazz and Modernism (3.0 cr)
MUS 5805 - Worlds of Improvisation (3.0 cr)
MUS 5950 - Topics in Music (1.0 - 4.0 cr)
MUS 8501 - Music Theory Pedagogy (3.0 cr)
MUS 8550 - Composition (3.0 cr)
MUS 8560 - Readings in Music Theory (3.0 cr)
MUS 8570 - Seminar in Composition (2.0 cr)
MUS 8571 - Composers' Laboratory (3.0 cr)
MUS 8580 - Topics in Tonal Analysis (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8591 - Introduction to Music Information Technology (3.0 cr)
MUS 8592 - Music Informatics Seminar (3.0 cr)
MUS 5620 - Topics in Opera History (3.0 cr)
MUS 5624 - Music of J. S. Bach (3.0 cr)
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
MUS 5647 - 20th-Century European/American Music (3.0 cr)
MUS 5731 - Jazz and Modernism (3.0 cr)
MUS 5805 - Worlds of Improvisation (3.0 cr)
MUS 5950 - Topics in Music (1.0 - 4.0 cr)
MUS 8501 - Music Theory Pedagogy (3.0 cr)
MUS 8550 - Composition (3.0 cr)
MUS 8560 - Readings in Music Theory (3.0 cr)
MUS 8570 - Seminar in Composition (2.0 cr)
MUS 8571 - Composers' Laboratory (3.0 cr)
MUS 8580 - Topics in Tonal Analysis (3.0 cr)
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)

Electives (3 credits)
Select 3 credits from the following in consultation with the advisor:
- MUS 5xxx
- MUS 8xxx

-OR-

Wind Ensemble/Band Conducting (32 credits)

Emphasis Coursework (14 credits)
Take the following courses. Take 9 credits of MUS 8450 in consultation with the advisor.
- MUS 5561 - Orchestration I (3.0 cr)
- MUS 8450 - Graduate Seminar in Conducting (3.0 - 4.0 cr)
- MUS 8479 - Performance and Document: Wind Ensemble/Band Conducting (2.0 cr)

Music Theory/Musicology Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. If MUS 5950 is selected, it must be taken for 3 credits.
- MUS 5534 - Musical Minimalisms (3.0 cr)
- MUS 5550 - Class Composition for Performers (3.0 cr)
- MUS 5571 - Schenkerian Analysis for Performers (3.0 cr)
- MUS 5572 - Chromatic Harmony (3.0 cr)
- MUS 5591 - Introduction to Music Information Technology (3.0 cr)
- MUS 5592 - Music Informatics Seminar (3.0 cr)
- MUS 5620 - Topics in Opera History (3.0 cr)
- MUS 5624 - Music of J. S. Bach (3.0 cr)
- MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr)
- MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr)
- MUS 5647 - 20th-Century European/American Music (3.0 cr)
- MUS 5731 - Jazz and Modernism (3.0 cr)
- MUS 5805 - Worlds of Improvisation (3.0 cr)
- MUS 5950 - Topics in Music (1.0 - 4.0 cr)
- MUS 8501 - Music Theory Pedagogy (3.0 cr)
- MUS 8550 - Composition (3.0 cr)
- MUS 8560 - Readings in Music Theory (3.0 cr)
- MUS 8570 - Seminar in Composition (2.0 cr)
- MUS 8571 - Composers' Laboratory (3.0 cr)
- MUS 8580 - Topics in Tonal Analysis (3.0 cr)
- MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)
- MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)
- MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)

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Information current as of November 07, 2022
MUS 8585 - Chromatic Harmony Seminar (3.0 cr)
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)
MUS 8640 - Seminar in Musicology (3.0 cr)
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music—Method and Practice (3.0 cr)
MUS 8588 - Sonata Theory (3.0 cr)
MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

Electives (12 credits)
Select 12 elective credits in consultation with the advisor.
MUSA 5xxx
MUSA 8xxx

-OR-

Music Education - Pedagogical Track (33 credits)

Foundations Coursework (9 credits)
Take the following courses. Select 3 MUED 5xxx- or 8xxx-level credits in consultation with the advisor.
MUED 8115 - Assessment in Arts Education (3.0 cr)
MUED 8211 - Foundations of Music Education (3.0 cr)
MUED 5xxx
MUED 8xxx

Pedagogical Concentration (12 credits)
Take the following courses, plus 6 MUED credits selected in consultation with the advisor, for a total of 12 credits.
MUED 8210 - Advanced Music Teaching Seminar (3.0 cr)
MUED 8212 - Curriculum Design in Music Education (3.0 cr)
MUED 5xxx
MUED 8xxx

Supportive Studies in Music (9 credits)
Select 9 credits from the following in consultation with the advisor. Up to 4 credits can be MUSA 5xxx-level coursework.
MUS 5xxx
MUS 8xxx
MUSA 5xxx

Research Project (3 credits)
Take 3 credits of the following in consultation with the advisor:
MUED 8880 - Master's Research Project (3.0 - 6.0 cr)

-OR-

Music Education - Research Track (33 credits)

Foundations Coursework (12 credits)
Take the 12 credits of the following. Other MUED 5xxx/ 8xxx or CEHD courses may be substituted for these courses with advisor approval.
MUED 8112 - Introduction to Research Methods and Design in Arts Education (3.0 cr)
MUED 8115 - Assessment in Arts Education (3.0 cr)
MUED 8118 - Qualitative Research in Arts Education (3.0 cr)
MUED 8211 - Foundations of Music Education (3.0 cr)

Pedagogical Concentration (6 credits)
Take the following course and 3 credits from MUED 5xxx/8xxx, CEHD or other CLA disciplines selected in consultation with the advisor.
MUED 8212 - Curriculum Design in Music Education (3.0 cr)
MUED 5xxx
MUED 8xxx

Supportive Studies in Music (9 credits)
Select 9 credits from the following in consultation with the advisor:
MUS 5xxx
MUS 8xxx
Up to 4 credits from the following can be applied to this 9-credit requirement with advisor approval:
MUSA 5xxx

Research Project (6 credits)
Take 6 credits from the following in consultation with the advisor:
MUED 8880 - Master's Research Project (3.0 - 6.0 cr)
**Twin Cities Campus**

**Music Minor**

*School of Music*

*College of Liberal Arts*

Link to a list of faculty for this program.

**Contact Information:**
Department of School of Music, 100 Ferguson Hall, 2106 4th St S, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: [http://www.music.umn.edu](http://www.music.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 12
  - This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](http://catalog.umn.edu) section of the catalog website for requirements that apply to all major fields.

Doctoral students interested in the theory and history of music are invited to pursue the Music minor.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

*Special Application Requirements:*
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Music director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the [General Information](http://catalog.umn.edu) section of the catalog website.

**Program Requirements**

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

**Coursework (12 credits)**

Select 12 credits from the following in consultation with the Music director of graduate studies. One 5xxx-level MUS course or one MUSA 83xx course may be applied to this requirement with prior approval of the director of graduate studies.

- **MUS 8501 - Music Theory Pedagogy (3.0 cr)**
- **MUS 8550 - Composition (3.0 cr)**
- **MUS 8560 - Readings in Music Theory (3.0 cr)**
- **MUS 8570 - Seminar in Composition (2.0 cr)**
- **MUS 8571 - Composers' Laboratory (3.0 cr)**
- **MUS 8580 - Topics in Tonal Analysis (3.0 cr)**
- **MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr)**
- **MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr)**
- **MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr)**
- **MUS 8585 - Chromatic Harmony Seminar (3.0 cr)**
- **MUS 8590 - Topics in 20th-Century Analysis (3.0 cr)**
- **MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)**
- **MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr)**
- **MUS 8640 - Seminar in Musicology (3.0 cr)**
- **MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)**
- **MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)**
- **MUS 8588 - Sonata Theory (3.0 cr)**
- **MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)**
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Music Ph.D.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 69 to 90
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Music PhD offers emphases in music theory, musicology/ethnomusicology, composition, and music education.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must hold a masters degree in an appropriate field of study.

Special Application Requirements:
Music Theory: Two original papers (one tonal and one post-tonal analysis)

Musicology/Ethnomusicology: Original papers

Composition: Original scores and recordings (2-4 scores of varying genres)

Music Education: One research or professional papers to demonstrate scholarly writing; documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience; and an interview

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
33 to 58 credits are required in the major. 
6 to 15 credits are required outside the major. 
24 thesis credits are required. 

This program may be completed with a minor. 

Use of 4xxx courses towards program requirements is not permitted. 

Language Requirement: See Other Requirements below 

A minimum GPA of 3.00 is required for students to remain in good standing. 

At least 2 semesters must be completed before filing a Degree Program Form. 

Coursework offered on both the A-F and S/N grade basis must be taken A-F. 
Musicology students may, in consultation with their advisor, pursue a minor in an outside department. 

Language requirements 

Music Theory: German and either French or Italian. The French or Italian requirement can be satisfied by a collateral field of knowledge or special research technique. When a different language is needed for the thesis, a substitution may be requested. Substitutions require advisor and director of graduate studies approval. 

Musicology/Ethnomusicology: Two languages chosen from French, German, and Italian. When a different language is needed for the thesis, a substitution may be requested. Substitution requires advisor and director of graduate studies approval. 

Composition: Reading knowledge of two foreign languages. An equivalent research tool may be substituted for a foreign language. Substitution requires advisor and director of graduate studies approval. 

Music Education: No language requirement. 

Thesis Credits 
Take 24 doctoral thesis credits. 
MUS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr) 

Emphases 

Music Theory (51 credits) 
Music Theory/Analysis Coursework (30 credits) 
Select 30 credits from the following in consultation with the advisor: 
MUS 8501 - Music Theory Pedagogy (3.0 cr) 
MUS 8560 - Readings in Music Theory (3.0 cr) 
MUS 8580 - Topics in Tonal Analysis (3.0 cr) 
MUS 8581 - Schenkerian Theory and Analysis I (3.0 cr) 
MUS 8582 - Schenkerian Theory and Analysis II (3.0 cr) 
MUS 8584 - Current Issues in the Analysis of 19th-Century Music (3.0 cr) 
MUS 8585 - Chromatic Harmony Seminar (3.0 cr) 
MUS 8590 - Topics in 20th-Century Analysis (3.0 cr) 
MUS 8994 - Directed Research (1.0 - 3.0 cr) 

Musicology/Ethnomusicology Coursework (6 credits) 
Select 6 credits from the following in consultation with the advisor. Topics courses, if selected, must be taught by a musicology faculty member and approved by the advisor. 
MUS 5620 - Topics in Opera History (3.0 cr) 
MUS 5624 - Music of J. S. Bach (3.0 cr) 
MUS 5630 - Performance Practice: 1700 to the Present (3.0 cr) 
MUS 5631 - Beethoven Sonatas for Solo Piano, Violin, & Cello (3.0 cr) 
MUS 5647 - 20th-Century European/American Music (3.0 cr) 
MUS 5950 - Topics in Music (1.0 - 4.0 cr) 
MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr) 
MUS 8632 - Seminar: Music in Early Modern Europe (3.0 cr) 
MUS 8640 - Seminar in Musicology (3.0 cr) 
MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
MUS 8647 - Seminar: The Critical Editing of Early Music--Method and Practice (3.0 cr)

Electives (3 credits)
Select 3 credits from the following list. Advisor approval is required.
- MUS 5xxx
- MUS 8xxx
- MUSA 5xxx
- MUSA 8xxx
- MUED 5xxx
- MUED 8xxx

Outside Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor. MUED and Music Therapy courses can be applied to this requirement with advisor approval.
- ESL 5302 - Academic Writing (4.0 cr)
- GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
- WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

MUS 5xxx

MUS 8xxx

MUSA 5xxx

MUSA 8xxx

MUED 5xxx

MUED 8xxx

Musicology/Ethnomusicology (45 credits)

Required Courses (9 credits)
Take the following courses. Select MUS 85xx seminar topics in consultation with the advisor.
- MUS 8644 - Seminar: Advanced Research in Historical Musicology (3.0 cr)
- MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)
- MUS 85xx - Seminar in Music Theory (3.0 cr)

Electives (24 credits)
Select 24 credits from the following in consultation with the advisor.
- MUS 56xx
- MUS 58xx
- MUS 85xx
- MUS 86xx
- MUS 88xx

Outside Coursework (12 credits)
Select 12 credits outside the major in consultation with the advisor. MUED and Music Therapy courses can be included with advisor approval.
- MUED 5xxx
- MUED 8xxx

Composition (64 credits)

Required Coursework (6 credits)
Take the following courses:
- MUS 5591 - Introduction to Music Information Technology (3.0 cr)
- MUS 5592 - Music Informatics Seminar (3.0 cr)

Composition Coursework (24 credits)
Take MUS 8550 8 times for a total of 24 credits.
- MUS 8550 - Composition (3.0 cr)

Theory/Analysis Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor:
- MUS 85xx

Ensemble (4 credits)
Select 4 credits from the following in consultation with the advisor:
- MUS 5240 - University Singers (1.0 cr)
- MUS 5280 - Opera Theatre (2.0 cr)
- MUS 5340 - Jazz Ensemble (1.0 cr)
- MUS 5410 - University Wind Bands (1.0 cr)
- MUS 5420 - Orchestra (1.0 cr)
- MUS 5440 - Chamber Ensemble (1.0 cr)
- MUS 5460 - World Music Ensemble (1.0 - 2.0 cr)
- MUS 5490 - Percussion Ensemble (1.0 cr)
- MUS 5493 - Javanese Gamelan Music Ensemble (1.0 cr)
- MUS 5494 - West African Music Ensemble (1.0 cr)

Musicology/Ethnomusicology Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor:
- MUS 56xx
Creative Studies and Media Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor:
MUS 5xxx
MUS 8xxx

Outside Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. MUED and Music Therapy courses can be included with advisor approval.
MUED 5xxx
MUED 8xxx

Music Education (66 credits)
Required Course (3 credits)
Take the following course:
MUED 8284 - Seminar: Research and Scholarly Issues (3.0 cr)

Trends in Music Education Seminar (9 credits)
Take the following course 3 times for a total of 9 credits.
MUED 8280 - Seminar: Current Trends in Music Education (3.0 cr)

Research Core (9 credits)
All students take MUED 8119 and select 6 additional credits from the following in consultation with the advisor.
MUED 8119 - Advanced Applications of Research Methods (3.0 cr)
MUED 8112 - Introduction to Research Methods and Design in Arts Education (3.0 cr)
MUED 8115 - Assessment in Arts Education (3.0 cr)
MUED 8118 - Qualitative Research in Arts Education (3.0 cr)

Musicology/Ethnomusicology, Theory, and Creative Studies and Media Coursework (18 credits)
Select 18 credits from the following in consultation with the advisor. A minimum of 2 courses from 2 of the 3 disciplines of Musicology/Ethnomusicology, Theory, and Creative Studies and Media is required.
MUS 55xx
MUS 56xx
MUS 85xx
MUS 86xx

Electives (12 credits)
Select 12 credits from the following in consultation with the advisor:
MUED 5xxx
MUED 8xxx

Outside Coursework (15 credits)
Select 15 credits outside the major in consultation with the advisor.
Twin Cities Campus
Philosophy M.A.
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-625-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Philosophy graduate program rarely accepts applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Philosophy PhD program. In rare instances, MA applications are considered for individuals with professional goals in other fields.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Preferred: Broad undergraduate background that includes some philosophy coursework.

Special Application Requirements:
Note: The Philosophy graduate program rarely accepts applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Philosophy PhD program.

MA applications are considered for individuals with professional goals in other fields. Candidates admitted to the terminal MA may opt for the MA Plan A or MA Plan B. Please refer to the Department of Philosophy website at www.philosophy.umn.edu for information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The project comprises 3 Plan B papers completed in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with advisor approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

4xxx-level courses are primarily for advanced undergraduate students. MA candidates should enroll in the 5xxx or 8xxx level equivalent course. In special cases, 4xxx-level courses will be accepted but must accompany the 8xxx-level workshop to be counted for graduate credit. Permission is required from the director of graduate studies. See the Department of Philosophy website at www.philosophy.umn.edu for more information.

Coursework offered on both the A-F and S/N grading basis must be taken A-F.

Major Coursework (14 to 24 credits)
Plan A students select 14 credits, and Plan B students select 24 credits from the following, in consultation with the advisor and director of graduate studies. Coursework should include one course in ancient and one course in modern philosophy. Non-PHIL courses may be applied to this requirement with advisor and director of graduate studies approval.

PHIL 5xxx
PHIL 8xxx

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor and director of graduate studies.

Plan Options

Plan A
Thesis Credits
Take 10 masters thesis credits.
PHIL 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Philosophy Minor
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-625-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students pursuing the Philosophy minor have the opportunity to expand their knowledge, in consultation with the Philosophy director of graduate studies, in any of the following areas: history of philosophy (ancient or modern), logic, ELMS, epistemology, philosophy of language, metaphysics or mathematics, philosophy of science (philosophy of biology, philosophy of physics), moral and political philosophy, and value theory aesthetics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Philosophy director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each course, to be applied to minor field requirements.

The minimum cumulative GPA for minor field coursework is 3.00.

Application of 4xxx-level toward the minor requires approval of the Philosophy director of graduate studies, and is permitted only when taken in conjunction with an appropriate 8xxx-level workshop. Workshop selection is based on the area of philosophy: 8010 (history of phil); 8100 (epistemology and metaphysics); 8200 (logic and philosophy of math, language); 8300 (moral and political) 8600 (philosophy of science).

Coursework (6 to 12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Philosophy director of graduate studies:
PHIL 5xxx
PHIL 8xxx
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Philosophy Ph.D.
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-624-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 62
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Philosophy PhD is noteworthy for its emphasis on the individual student's research interests. With the help of an advisor, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor that complements the student's research focus. Students gain a broad base of knowledge in history of philosophy, logic, ELMS (epistemology, philosophy of language, metaphysics or mathematics, philosophy of science), moral and political philosophy, and value theory, which provides a firm foundation for research and teaching beyond the PhD program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Broad undergraduate background that includes substantial philosophy coursework.

Special Application Requirements:
Individuals apply to the University and the Department of Philosophy via the University's online admissions system. Application materials include the application form; personal statement; diversity statement; transcripts; three academic letters of recommendation; and a philosophical writing sample not to exceed 25 pages. For more information regarding application requirements and funding opportunities, refer to the Department of Philosophy website at www.philosophy.umn.edu.

Applications must be received by December 31 for the following fall semester.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB

Key to test abbreviations: (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
26 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Coursework offered on both the A-F and S/N grading basis must be taken A-F.

Application of 4xxx-level coursework toward degree requirements requires advisor approval, and is permitted only when taken in conjunction with an appropriate 8xxx-level workshop. Workshop selection is based on the area of philosophy: 8010 (history of phil); 8100 (epistemology and metaphysics); 8200 (logic and philosophy of math, language); 8300 (moral and political) 8600 (philosophy of science). See the Department of Philosophy website at www.philosophy.umn.edu for more information.

**Major Coursework (26 credits)**
Select 26 credits from the following, in consultation with the advisor and director of graduate studies. Non-PHIL courses may be applied to this requirement with advisor and director of graduate studies approval.

PHIL 5xxx
PHIL 8xxx

**Outside Coursework (12 credits)**
Select 12 credits outside the major in consultation with the advisor and director of graduate studies.

**Thesis Credits**
Take a total of 24 doctoral thesis credits beginning the second semester of Year 1.

PHIL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Political Psychology Minor
School of Journalism & Mass Communication, Political Science Department, Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455-0410
Email: polipsych@umn.edu
Website: https://cla.umn.edu/political-psychology/academics/grad-minor-political-psychology

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Political psychology is a rapidly advancing field of scientific inquiry concerned with psychological aspects of political behavior. It encompasses a variety of interdisciplinary research perspectives, drawing on the theories and methods of core disciplines such as psychology, political science, law, and sociology, as well as interdisciplinary fields such as mass communication and decision sciences. The minor's structured curriculum provides a foundation in basic areas of political psychology: ideology, partisanship, and political attitudes; political cognition; judgment and decision making; racial and ethnic attitudes and the psychology of intergroup relations in unequal societies; personality and leadership; mass communication; public opinion and mass political behavior; and political socialization. In addition to providing a background in political psychology, the program trains students in the theory and methods useful to this field, such as content analysis, survey analysis, and experimental design. The faculty is drawn from across the University.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Political Psychology director of graduate studies regarding feasibility and requirements.

Knowledge of quantitative methods, gained prior to or during the course of graduate studies, is strongly encouraged.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minimum cumulative GPA for minor field coursework is 3.30.

Core Coursework (9 credits)
Take the following courses. Other courses may be substituted with approval of the Political Psychology director of graduate studies.
JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
POL 8311 - Political Psychology and Socialization (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)

Political Psychology Proseminars (4 credits)
Select 1 of the following proseminar sequences in consultation with the Political Psychology director of graduate studies:
POL 8307 - Proseminar in Political Psychology I (2.0 cr)
POL 8308 - Proseminar in Political Psychology II (2.0 cr)
or PSY 8211 - Proseminar in Political Psychology I (2.0 cr)
PSY 8212 - Proseminar in Political Psychology II (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Political Science M.A.
Political Science Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4144; fax: 612-626-7599)
Email: polisci@umn.edu
Website: http://www.polisci.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Political Science graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Political Science PhD program.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Note: The Political Science graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Political Science PhD program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 27 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Three research papers, usually written in connection with coursework, are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must select and complete requirements for 2 emphases.

Major Elective (3 credits)
Select 3 elective credits in consultation with the advisor.

POL 8xxx

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor.

AFRO 8910 - Topics in Studies of Africa and the African Diaspora (3.0 cr)
AMIN 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
AMST 8920 - Topics in American Studies (3.0 cr)
ANTH 5021W - Anthropology of the Middle East [SOCS, GP, WI] (3.0 cr)
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
ANTH 8992 - Directed Reading (1.0 - 18.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
APEC 5451 - Food Marketing Economics (3.0 cr)
APEC 5481 - Futures and Options Markets (3.0 cr)
APEC 5721 - Economics of Science and Technology Policy (3.0 cr)
APEC 5751 - Global Trade and Policy (3.0 cr)
APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
APEC 8601 - Natural Resource Economics (3.0 cr)
APEC 8793 - Master's Paper: Plan B Project (1.0 - 6.0 cr)
APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
APEC 8902 - Graduate Research Development Seminar (1.0 cr)
ARAB 5101 - Advanced Arabic I (4.0 cr)
ARAB 5102 - Advanced Arabic II (4.0 cr)
CHIC 5993 - Directed Studies (1.0 - 3.0 cr)
CLA 8000 - Topics in Graduate Studies (1.0 - 3.0 cr)
COMM 5221 - Media, Race, and Identity (3.0 cr)
DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)
DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
ENGL 5300 - Readings in American Minority Literature (3.0 cr)
ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
ESL 5008 - Speaking for Professional Settings (2.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)
GER 5610 - German Literature in Translation (3.0 cr)
GIS 5578 - GIS Programming (3.0 cr)
GLOS 5403 - Human Rights Advocacy (3.0 cr)
GRAD 5105 - Practicum in University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
GWSS 8107 - Feminist Pedagogies (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)
GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
GWSS 8490 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
GWSS 8993 - Directed Study (1.0 - 6.0 cr)
GWSS 8995 - Directed Research (1.0 - 8.0 cr)
GWSS 8996 - Feminist Studies Colloquium (1.0 cr)
HIST 5264 - Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries (3.0 cr)
HIST 5265 - 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime (3.0 cr)
HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
HIST 5960 - Topics in History (1.0 - 4.0 cr)
HIST 8801 - Seminar in Early American History (3.0 cr)
HIST 8802 - Readings in American History, 1848-Present (3.0 cr)
HIST 8900 - Topics in European/Medieval History (1.0 - 4.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
JOUR 5251 - Strategic Communication Theory (3.0 cr)
JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
**Emphases**

**Political Theory**

**Required Course (3 Credits)**

Students selecting the Political Theory emphasis must take the following course:

**POL 8201** - Understanding Political Theory (3.0 cr)

**Electives (9 credits)**

Select 9 credits from the following, in consultation with the advisor, to complete the Political Theory emphasis.

- **POL 8235** - Democratic Theory (3.0 cr)
- **POL 8251** - Ancient and Medieval Political Thought (3.0 cr)
- **POL 8252** - Early Modern Political Thought (3.0 cr)
- **POL 8253** - Late Modern Political Thought (3.0 cr)
- **POL 8260** - Topics in Political Theory (3.0 cr)

**-OR-**

**American Politics**

**Required Course (3 credits)**

Students selecting the American Politics emphasis must take the following course:

**POL 8301** - American Politics (3.0 cr)

**Electives (9 credits)**

Select 9 credits from the following, in consultation with the advisor, to complete the American Politics emphasis.

- **POL 8302** - Public Opinion and Political Behavior (3.0 cr)
- **POL 8311** - Political Psychology and Socialization (3.0 cr)
- **POL 8312** - Legislative Process (3.0 cr)
- **POL 8337** - Welfare State Theories and American Social Policy (3.0 cr)
POL 8360 - Topics in American Politics (3.0 cr)

-OR-

International Relations

Required Course (3 credits)
Students selecting the International Relations emphasis must take the following course:
POL 8401 - International Relations (3.0 cr)

Electives (9 credits)
Select 9 credits from the following, in consultation with the advisor, to complete the International Relations emphasis.
POL 8402 - International Security (3.0 cr)
POL 8403 - International Norms and Institutions (3.0 cr)
POL 8405 - International Political Economy (3.0 cr)
POL 8460 - Topics in International Relations (3.0 cr)

-OR-

Comparative Politics

Required Course (3 credits)
Students selecting the Comparative Politics emphasis must take the following course:
POL 8601 - Introduction to Comparative Politics (3.0 cr)

Electives (9 credits)
Select 9 credits from the following, in consultation with the advisor, to complete the Comparative Politics emphasis.
POL 8637 - Comparative Political Economy (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)

-OR-

Formal Models and Methodology

Required Course (12 credits)
Students selecting the Formal Models and Methodology emphasis must take the following courses:
POL 8120 - Core Course in Political Methodology: Modeling Political Processes (3.0 cr)
POL 8107 - Quantitative Political Science II (3.0 cr)
POL 8108 - Maximum Likelihood Estimation (3.0 cr)
POL 8124 - Game Theory (3.0 cr)
Twin Cities Campus
Political Science Ph.D.
Political Science Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4144; fax: 612-626-7599)
Email: polisci@umn.edu
Website: http://cla.umn.edu/polisci/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The political science curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
All students are admitted directly into the Ph.D. program. To apply, submit the following through the University's graduate online application: Unofficial transcripts, research and diversity statements, GRE scores, three letters of recommendation, curriculum vitae or resume, writing sample, TOEFL or IELTS for non-native English speakers.

The application deadline is December 15. For more information, see the Political Science Admissions website.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
6 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.30 is required for students to remain in good standing.

Students must select and complete the requirements for 2 emphases.

Professional Development Coursework (3 credits)
Take POL 8104 spring semester the first year of study, and POL 8105 fall semester the third year of study.
POL 8104 - Professional Development I (2.0 cr)
POL 8105 - Professional Development II (1.0 cr)

Additional Elective (3 credits)
Select 3 elective credits in consultation with the advisor.
Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor.

- **AFRO 8910** - Topics in Studies of Africa and the African Diaspora (3.0 cr)
- **AMIN 8910** - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
- **ANTH 5021W** - Anthropology of the Middle East [SOCS, GP, WI] (3.0 cr)
- **ANTH 5980** - Topics in Anthropology (3.0 cr)
- **ANTH 8002** - Ethnography: Contemporary Theory and Practice (3.0 cr)
- **ANTH 8203** - Research Methods in Social and Cultural Anthropology (3.0 cr)
- **ANTH 8810** - Topics in Sociocultural Anthropology (3.0 cr)
- **ANTH 8992** - Directed Reading (1.0 - 18.0 cr)
- **APEC 5031** - Methods of Economic Data Analysis (3.0 cr)
- **APEC 5032** - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- **APEC 5151** - Applied Microeconomics: Firm and Household (3.0 cr)
- **APEC 5451** - Food Marketing Economics (3.0 cr)
- **APEC 5481** - Futures and Options Markets (3.0 cr)
- **APEC 5721** - Economics of Science and Technology Policy (3.0 cr)
- **APEC 5751** - Global Trade and Policy (3.0 cr)
- **APEC 8001** - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- **APEC 8002** - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- **APEC 8001** - Master's Project: Plan B Project (1.0 - 6.0 cr)
- **APEC 8002** - Graduate Seminar: MS & PhD (1.0 cr)
- **APEC 8902** - Advanced Arabic I (4.0 cr)
- **ARAB 5101** - Advanced Arabic II (4.0 cr)
- **CLLA 8000** - Topics in Graduate Studies (1.0 - 3.0 cr)
- **COMM 5221** - Media, Race, and Identity (3.0 cr)
- **DSSC 8111** - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
- **DSSC 8112** - Scholarship and Public Responsibility (1.0 cr)
- **DSSC 8211** - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)
- **DSSC 8310** - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
- **ENGL 5300** - Readings in American Minority Literature (3.0 cr)
- **ENGL 8400** - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
- **EPSY 8266** - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- **ESL 5008** - Speaking for Professional Settings (2.0 cr)
- **FNRM 5131** - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- **GEOG 8980** - Topics: Geography (1.0 - 3.0 cr)
- **GER 5610** - German Literature in Translation (3.0 cr)
- **GIS 5578** - GIS Programming (3.0 cr)
- **GLOS 5403** - Human Rights Advocacy (3.0 cr)
- **GRAD 5105** - Practicum in University Teaching for Nonnative English Speakers (2.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)
- **GRAD 8200** - Teaching and Learning Topics in Higher Education (1.0 cr)
- **GWSS 5190** - Topics: Theory, Knowledge, and Power (3.0 cr)
- **GWSS 5406** - Black Feminist Thought in the American and African Diasporas (3.0 cr)
- **GWSS 8107** - Feminist Pedagogies (3.0 cr)
- **GWSS 8109** - Feminist Knowledge Production (3.0 cr)
- **GWSS 8220** - Seminar: Science, Technology & Environmental Justice (3.0 cr)
- **GWSS 8480** - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
- **GWSS 8993** - Directed Study (1.0 - 6.0 cr)
- **GWSS 8995** - Directed Research (1.0 - 8.0 cr)
- **GWSS 8996** - Feminist Studies Colloquium (1.0 cr)
- **HIST 5264** - Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries (3.0 cr)
- **HIST 5265** - 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime (3.0 cr)
- **HIST 5932** - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
- **HIST 5960** - Topics in History (1.0 - 4.0 cr)
- **HIST 8801** - Seminar in Early American History (3.0 cr)
- **HIST 8802** - Readings in American History, 1848-Present (3.0 cr)
- **HIST 8900** - Topics in European/Medieval History (1.0 - 4.0 cr)
- **HIST 8910** - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
JOUR 5251 - Strategic Communication Theory (3.0 cr)
JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
JOUR 8504 - Seminar: Analyzing Media Content (3.0 cr)
JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
LAW 5000 - Introduction to American Law and Legal Reasoning (3.0 cr)
LAW 6039 - U.S. Supreme Court and Great Cases that have Shaped the Nation (3.0 cr)
LAW 6071 - International Law (3.0 cr)
LAW 6081 - Constitutional Law: Fourteenth Amendment (3.0 cr)
LAW 6084 - Equal Protection: Race and the Civil Rights Acts (3.0 cr)
LAW 6846 - Philosophy of Punishment (3.0 cr)
LAW 6886 - International Human Rights Law (3.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5561 - Gender and International Development (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PA 8081 - Capstone Workshop (3.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)
PA 8991 - Independent Study (0.5 - 4.0 cr)
PHIL 8110 - Seminar: Metaphysics (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
PSY 8205 - Principles of Social Psychology (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PSY 8664 - Personality Assessment (3.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8311 - Political Sociology (3.0 cr)
SOC 8731 - Sociology of Knowledge (3.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
POL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Emphases
Select 2 emphases in consultation with the advisor. Complete the 12 credits required for each for a total of 24 credits.

Political Theory
Required Course (3 credits)
Students selecting the Political Theory emphasis must take the following course:
POL 8201 - Understanding Political Theory (3.0 cr)
Electives (9 credits)
Select 9 credits from the following, in consultation with the advisor, to complete the Political Theory emphasis.
POL 8235 - Democratic Theory (3.0 cr)
POL 8251 - Ancient and Medieval Political Thought (3.0 cr)
POL 8252 - Early Modern Political Thought (3.0 cr)
POL 8253 - Late Modern Political Thought (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
American Politics
Required Course (3 Credits)
Students selecting the American Politics emphasis must take the following course:
POL 8301 - American Politics (3.0 cr)
Electives (9 credits)
Select 9 credits from the following, in consultation with the advisor, to complete the American Politics emphasis.
POL 8302 - Public Opinion and Political Behavior (3.0 cr)
POL 8311 - Political Psychology and Socialization (3.0 cr)
POL 8312 - Legislative Process (3.0 cr)
POL 8337 - Welfare State Theories and American Social Policy (3.0 cr)
POL 8360 - Topics in American Politics (3.0 cr)

International Relations
Required Course (3 credits)
Students selecting the International Relations emphasis must take the following course:
POL 8401 - International Relations (3.0 cr)
Electives (9 credits)
Select 9 credits from the following, in consultation with the advisor, to complete the International Relations emphasis.
POL 8402 - International Security (3.0 cr)
POL 8403 - International Norms and Institutions (3.0 cr)
POL 8405 - International Political Economy (3.0 cr)
POL 8460 - Topics in International Relations (3.0 cr)

Comparative Politics
Required Course (3 credits)
Students selecting the Comparative Politics emphasis must take the following course:
POL 8601 - Introduction to Comparative Politics (3.0 cr)
Electives (9 credits)
Select 9 credits from the following, in consultation with the advisor, to complete the Comparative Politics emphasis.
POL 8637 - Comparative Political Economy (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)

Formal Models and Methodology
Required Course (12 credits)
Students selecting the Political Models and Methodology emphasis must take the following courses:
POL 8120 - Core Course in Political Methodology: Modeling Political Processes (3.0 cr)
POL 8107 - Quantitative Political Science II (3.0 cr)
POL 8108 - Maximum Likelihood Estimation (3.0 cr)
POL 8124 - Game Theory (3.0 cr)
Twin Cities Campus
Population Studies Minor
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences, 267 19th Ave S, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: popminor@umn.edu
Website: https://pop.umn.edu/training/graduate/population-studies-minor

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Population studies is a multidisciplinary research area at the intersection of the mathematical sciences, the health and social sciences, and public policy. The curriculum provides a solid grounding in the theories and methods of demography, with additional specialized training across five interdisciplinary subject areas: historical demography, population geography, economic demography, public health demography, and family and life course demography.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Population Studies director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Use of 4xxx courses towards program requirements is not permitted.

Minor field coursework should be from the same subject area and may not be in the student's major field.

Coursework applied to the minor must be approved by the Population Studies director of graduate studies.

Coursework applied to the minor must be taken A-F unless offered only S/N, with a minimum grade of C earned for each course.

The minimum cumulative GPA for minor field coursework is 2.8.

Required Course (3 credits)
Take the following course:
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)

Electives (3 to 9 credits)
Masters students select 3 credits, doctoral students 9 credits. If any of the following courses are chosen, take the section noted: HIST 5970 -- Fertility and the Family; HIST 8970 -- Demographic Transition; PA 5490 -- Politics and Policy of Demographic Change (3
credits); SOC 8540 -- Patriarch, Power, & Pay; SOC 8890  Sex, Death, & Mobility (3 credits; PA 5022 -Economics for Policy Analysis & Planning II- Population Economics; SOC 8090/GEOG 8080 Global Health Data Analysis.

FW 5051 - Analysis of Populations (4.0 cr)
GERO 5103 - Aging and Society (2.0 cr)
HIST 5797 - Methods of Population History (3.0 cr)
HIST 8970 - Advanced Research in Quantitative History (3.0 cr)
PA 5022 - Applications of Economics for Policy Analysis (1.5 - 3.0 cr)
PA 5043 - Economic and Demographic Data Analysis (2.0 cr)
PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
PA 5451 *(Inactive)[3.0 cr)
PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
PA 8312 - Analysis of Discrimination (4.0 cr)
PA 8331 - Economic Demography (3.0 cr)
PA 8461 - Global and U.S. Perspectives on Health and Mortality (3.0 cr)
PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
PUBH 6737 - Structural Racism and Health (2.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8540 - Topics in Family Sociology (3.0 cr)
SOC 8551 - Life Course Inequality & Health (3.0 cr)
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Psychology M.A.
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3483)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Master’s
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Psychology graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Psychology PhD program.

Doctoral program specialties are offered in biological psychopathology; clinical science and psychopathology research; cognitive and brain sciences; counseling psychology; industrial/organizational psychology; personality, individual differences, and behavior genetics; quantitative/psychometric methods; and social psychology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: The Psychology graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Psychology PhD program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.
Capstone Project: The Plan B requires one to three review papers, and comprises the written component of the final examination.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

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Information current as of November 07, 2022
A minimum GPA of 3.00 is required for students to remain in good standing.

Use of 4xxx courses toward program requirements requires approval of the Psychology director of graduate studies in addition to advisor.

**Required Courses (14 credits)**
Select at least 14 credits from the following in consultation with the advisor:
PSY 5xxx
PSY 8xxx

**Outside Coursework (6 credits)**
Select at least 6 credits outside the major in consultation with the advisor.

**Plan Options**

**Plan A**
**Thesis Credits**
Take at least 10 masters thesis credits.
PSY 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B**
**Additional Credits (10 credits)**
Select at least 10 additional credits in consultation with the advisor to complete the 30-credit minimum.
PSY 5xxx
PSY 8xxx
Twin Cities Campus
Psychology Minor
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3483)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Psychology minor provides doctoral students with the opportunity to select coursework from the wide range of Psychology courses offered to meet their unique academic and professional goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Doctoral students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Psychology director of graduate studies, regarding feasibility and requirements. Approval of the Psychology director of graduate studies to complete the minor is required.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Application of 4xxx-level, minor coursework requires pre-approval of the Psychology director of graduate studies. The minimum cumulative GPA for coursework applied to the minor is 3.00.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Required Coursework (12 credits)
Select credits from the following to complete the minor field requirement. Approval of the Psychology director of graduate studies is required.
PSY 5xxx
PSY 8xxx
Twin Cities Campus
Psychology Ph.D.
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S246 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3483)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 53 to 112
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students are admitted only for the Ph.D. degree. The doctoral program offers tracks in clinical science and psychopathology research; cognitive and brain sciences; counseling psychology; industrial/organizational psychology; personality, individual differences, and behavior genetics; quantitative/psychometric methods; and social psychology.

Accreditation
This program is accredited by Counseling accredited by APA. CSPR accredited by APA and PCSAS.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Recommended academic preparation includes a minimum of 12 credits (three to four courses) of psychology coursework beyond introductory psychology, including one course in statistics or psychological measurement. An undergraduate major in psychology is preferred, but not required.

Special Application Requirements:
Applications are accepted for fall admission only; the deadline is December 1. Psychology PhD GRE General Test Requirements: Cognitive and Brain Sciences (CAB): Will not require students to submit GRE scores. If submitted, scores will not be considered. Clinical Science and Psychopathology Research (CSPR): Will not require students to submit GRE scores. Applicants who have scores may submit them as part of the programs holistic assessment of applicants qualifications and fit for the program. Counseling Psychology: Will not require students to submit GRE scores. Applicants who have scores may submit them as part of the programs holistic assessment of applicants qualifications and fit for the program. Industrial/Organizational Psychology (I-O): Requires the GRE. Personality, Individual Differences and Behavior Genetics (PIB): Requires the GRE. Quantitative/Psychometric Methods (QPM): Will not require students to submit GRE scores. Applicants are strongly encouraged to take the GRE if it is feasible and can be done without risk. Applicants who can obtain scores should submit them as part of the programs holistic assessment of applicants qualifications and fit for the program. Social Psychology: Will not require students to submit GRE scores. Applicants who have scores may submit them as part of the programs holistic assessment of applicants qualifications and fit for the program. Applicants identify their proposed track at the time of application. A department application; a statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with the applicant's scholarship and research potential; and scores from the GRE General Test are required. The GRE Subject Test in psychology is not required, but highly recommended. Applicants whose native language is not English must submit the results of the TOEFL iBT. Applications are submitted electronically through the online application system.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
29 to 76 credits are required in the major.
0 to 12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Approval of the director of graduate studies, in addition to that of the advisor, is required for use of 4xxx-level coursework.

Outside Coursework (0 to 12 credits)
Students pursuing either the Cognitive and Brain Sciences track or the Industrial/Organizational track must select at least 12 outside credits in consultation with the advisor. Students pursuing the other tracks may take outside courses in addition to required coursework.

Thesis Credits
Take 24 doctoral thesis credits.

PSY 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Clinical Science and Psychopathology Research
All CSPR (APCS) students without the master's upon matriculation must complete the University's Psychology MA degree (thesis option).

Core Clinical Coursework (37 credits)

Required Courses (33 credits)
Take the following courses:

CPSY 8608 - Clinical Interventions Across the Lifespan (3.0 cr)
PSY 8602 - Psychopathology & Personality (3.0 cr)
PSY 8603 - Clinical Seminar Series: Contemporary Directions in Clinical Psychology Research (1.0 cr)
PSY 8614 - Intellectual and Neuropsychological Assessment (3.0 cr)
PSY 8615 - Professional Methods in Applied Assessment I: Intellectual & Neuropsychological Functioning (3.0 cr)
PSY 8616 - Applied Assessment II, Personality and Psychopathology (3.0 cr)
PSY 8617 - Ethical and Equitable Decisions in Clinical Science and Counseling Psychology (3.0 cr)
PSY 8619 - Foundations in Therapeutic Intervention Applying Theory to Clinical Practice (3.0 cr)
PSY 8622 - Theories and Methods of Effective Intervention (3.0 cr)
PSY 8814 - Analysis of Psychological Data (4.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)

Clinical Psychology Practicum (4 credits)
Take 1 credit of the following at least 4 times in consultation with the advisor:
PSY 8620 - Clinical Practicum: Consultation, Supervision, Professional Standards, and Lifelong Learning (1.0 - 6.0 cr)

Research Courses (12 credits)
Select at least 12 credits from the following in consultation with the advisor:
PSY 5993 - Research Laboratory in Psychology (3.0 cr)
PSY 8993 - Directed Studies: Special Areas of Psychology and Related Sciences (1.0 - 6.0 cr)
Elective Breadth Courses (9 credits)
Select credits from at least 2 of the following areas, in consultation with the advisor, for a minimum of 9 credits. Other courses can be applied to the requirement with advisor approval.

### Brain Science (0 to 6 credits)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5063 - Introduction to Functional MRI (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
- PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661 - Behavioral Neuroscience (3.0 cr)

### Cognitive Science (0 to 6 credits)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
- PSY 5054 - Psychology of Language (3.0 cr)
- PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

### Developmental (0 to 6 credits)
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

### Differential/Behavior Genetics (0 to 6 credits)
- PSY 5135 - Psychology of Individual Differences (3.0 cr)
- PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)

### Industrial/Organizational (0 to 6 credits)
- PSY 5501 - Self, Society and Health - What's Work Got To Do With It? (3.0 cr)
- PSY 5701 - Employee Selection and Staffing (3.0 cr)
- PSY 5703 - Psychology of Organizational Training and Development (3.0 cr)
- PSY 5708 - Organizational Psychology (3.0 cr)

### Measurement (0 to 6 credits)
Psyc 5862 is required to satisfy the Measurement area. The additional courses below may be taken after 5862 is completed as a secondary Measurement fulfillment.
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)

### Personality (0 to 6 credits)
- PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
- PSY 8664 - Personality Assessment (3.0 cr)

### Sensation and Perception (0 to 6 credits)
- PSY 5031W - Perception [WI] (3.0 cr)
- PSY 5036W - Computational Vision [WI] (3.0 cr)
- PSY 5037 - Psychology of Hearing (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)

### Social (0 to 6 credits)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- PSY 5206 - Social Psychology and Health Behavior (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8202 - Close Relationships (3.0 cr)
- PSY 8203 - Impression Management (3.0 cr)
- PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
- PSY 8205 - Principles of Social Psychology (3.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)
- PSY 8209 - Research Methods in Social Psychology (3.0 cr)

### Statistics (0 to 6 credits)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)

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### Cognitive and Brain Sciences

#### Core Areas (12 credits)
Select credits from each of the 3 following areas, plus an additional credits 3, for a minimum of 12 credits. Courses are selected in consultation with the advisor.

#### Brain Science (3 to 6 credits)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661 - Behavioral Neuroscience (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5063 - Introduction to Functional MRI (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)

Cognitive Science (3 to 6 Credits)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5052 - Psychology of Attention (3.0 cr)
PSY 5054 - Psychology of Language (3.0 cr)
PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

Sensation and Perception (3 to 6 credits)
PSY 5031W - Perception [WI] (3.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PSY 5037 - Psychology of Hearing (3.0 cr)
PSY 8041 - Proseminar in Perception (3.0 cr)

Research Courses (3 credits)
Select at least 3 credits from the following in consultation with the advisor.
PSY 5993 - Research Laboratory in Psychology (3.0 cr)
PSY 8993 - Directed Studies: Special Areas of Psychology and Related Sciences (1.0 - 6.0 cr)

Quantitative Methods or Research Methodology (6 credits)
Select at least 6 credits from the following in consultation with the advisor.
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
NSC 8111 - Quantitative Neuroscience (3.0 cr)
PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 8814 - Analysis of Psychological Data (4.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)
PSY 8882 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

General Psychology/Neuroscience Courses (3 credits)
Select 3 credits from the following in consultation with the advisor. PSY 5993, PSY 50xx and PSY 80xx courses cannot be applied to this requirement.
NSC 5xxx
NSC 8xxx
PSY 5xx
PSY 8xxx

Outside Coursework (12 credits)
Select at least 12 credits of outside coursework in consultation with the advisor. This requirement can be met by completing a formal minor.

Counseling Psychology

Counseling Psychology
Required Courses (47 credits)
Take the following courses. Take 4 credits of PSY 8514 and 4 credits of PSY 8515. PSY 8960 may be applied to this requirement if the topic History and Methods of Psychology is taken.
PSY 5501 - Self, Society and Health - What's Work Got To Do With It? (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
PSY 8602 - Psychopathology & Personality (3.0 cr)
PSY 8501 - Counseling Psychology: History and Theories (3.0 cr)
PSY 8502 - Assessment in Counseling Psychology (3.0 cr)
PSY 8503 - Interviewing and Intervention (3.0 cr)
PSY 8514 - University Counseling Practicum I (4.0 - 6.0 cr)
PSY 8515 - University Counseling Practicum II (4.0 - 6.0 cr)
PSY 8541 - Multicultural Psychology (3.0 cr)
PSY 8617 - Ethical and Equitable Decisions in Clinical Science and Counseling Psychology (3.0 cr)
PSY 8545 - Counseling Psychology Process and Outcome Research (3.0 cr)
PSY 8814 - Analysis of Psychological Data (4.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)

Advanced Practicum (8 credits)
Take at least 1 credit of PSY 8560 the fall semester of years 3, 4, and 5 for a minimum total of 3 credits. Take 1 credit of PSY 8561 the spring semester of years 3, 4, and 5 for a minimum total of 3 credits. Take 1 credit of PSY 8565 (offered in the fall) and 1 credit of PSY 8566 (offered in the spring) year 3 or year 4 for a total of 2 credits.
PSY 8560 - Counseling Psychology Advanced Practicum I: General (1.0 - 3.0 cr)
PSY 8561 - Counseling Psychology Advanced Practicum II: General (1.0 - 3.0 cr)
PSY 8565 - Counseling Psychology Advanced Practicum I: Career Counseling and Assessment Clinic (1.0 - 6.0 cr)
PSY 8566 - Counseling Psychology Advanced Practicum II: Career Counseling and Assessment Clinic (1.0 - 6.0 cr)

General Psychology Electives (21 credits)
Affective and Biological Aspects of Behavior (6 credits)
Only 6 credits are required; however, students need to choose between PSY 5062 or PSY 5064 and PSY 5135 or PSY 5137 (one course from each pairing of two). Another 5xxx or 8xxx-level course on affect, mood, emotion, and multiple biological underpinnings of behavior can be applied to this requirement with advisor approval.
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5064 - Brain and Emotion (3.0 cr)
PSY 5135 - Psychology of Individual Differences (3.0 cr)
PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)

Cognitive Aspects of Behavior (3 credits)
Take the following course. Another 5xxx or 8xxx-level course on learning, memory, thought process, and decision-making can be applied to this requirement with advisor approval.
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)

Social Aspects of Behavior (3 credits)
Take the following course. Another 5xxx or 8xxx-level course on group processes, attributions, discrimination, and attitudes can be applied to this requirement with advisor approval.
PSY 5207 - Personality and Social Behavior (3.0 cr)

Developmental Aspects of Behavior (3 credits)
Select 3 credits from the following in consultation with the advisor. Another 5xxx or 8xxx-level course on transitions, growth, and lifespan development can be applied to this requirement with advisor approval.
CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
CPSY 5302 - Cognitive and Biological Development (3.0 cr)
CPSY 5303 - Social and Emotional Development (3.0 cr)
CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

Statistics (3 credits)
Select 3 credits from the following in consultation with the advisor. Another 5xxx or 8xxx-level advanced statistics course can be applied to this requirement with advisor approval.
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)

Industrial-Organizational Psychology

Course Requirements
Foundational Statistics and Measurement (11 Credits)
Take the following courses. Other courses can be applied to this requirement with advisor approval.
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 8814 - Analysis of Psychological Data (4.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)

Industrial-Organizational Psychology (16 Credits)
Select at least 16 credits from the following in consultation with the advisor. For the following three courses (PSY 5701, PSY 5703, PSY 5708), other courses with highly similar content and at highly similar level may be applied to this requirement with advisor approval.
PSY 5701 - Employee Selection and Staffing (3.0 cr)
PSY 5703 - Psychology of Organizational Training and Development (3.0 cr)
PSY 5708 - Organizational Psychology (3.0 cr)
PSY 8701 - Seminar in Industrial and Organizational Psychology I (3.0 cr)
PSY 8702 - Seminar in Industrial and Organizational Psychology II (3.0 cr)
PSY 8703 - Seminar in Industrial and Organizational Psychology III (3.0 cr)

Foundational Psychological Science (3 credits)
Select at least 3 credits, in consultation with the advisor, from one of the following 9 areas. Other courses at 5xxx-level or higher can be applied to this requirement with advisor approval.

Brain Science (0 to 3)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 5063 - Introduction to Functional MRI (3.0 cr)
PSY 5064 - Brain and Emotion (3.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
NSC 5661 - Behavioral Neuroscience (3.0 cr)

Cognitive Science (0 to 3)
PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5054 - Psychology of Language (3.0 cr)
PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)

Counseling (0 to 3 credits)
- PSY 5501 - Self, Society and Health - What's Work Got To Do With It? (3.0 cr)
- PSY 8501 - Counseling Psychology: History and Theories (3.0 cr)
- PSY 8502 - Assessment in Counseling Psychology (3.0 cr)
- PSY 8503 - Interviewing and Intervention (3.0 cr)
- PSY 8541 - Multicultural Psychology (3.0 cr)

Developmental (0 to 3 credits)
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

Differential/Behavior Genetics (0 to 3 credits)
- PSY 5135 - Psychology of Individual Differences (3.0 cr)
- PSY 5136 - Human Abilities (3.0 cr)
- PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)

Personality (0 to 3 credits)
- PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
- PSY 8664 - Personality Assessment (3.0 cr)

Psychopathology (0 to 3 credits)
- CPSY 8603 - Advanced Developmental Psychopathology (3.0 cr)
- PSY 8602 - Psychopathology & Personality (3.0 cr)
- PSY 8617 - Ethical and Equitable Decisions in Clinical Science and Counseling Psychology (3.0 cr)
- PSY 8616 - Applied Assessment II, Personality and Psychopathology (3.0 cr)
- PSY 8622 - Theories and Methods of Effective Intervention (3.0 cr)

Sensation and Perception (0 to 3 credits)
- PSY 5031W - Perception [WI] (3.0 cr)
- PSY 5036W - Computational Vision [WI] (3.0 cr)
- PSY 5037 - Psychology of Hearing (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)

Social (0 to 3 credits)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- PSY 5206 - Social Psychology and Health Behavior (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8202 - Close Relationships (3.0 cr)
- PSY 8203 - Impression Management (3.0 cr)
- PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
- PSY 8205 - Principles of Social Psychology (3.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)
- PSY 8209 - Research Methods in Social Psychology (3.0 cr)

Electives (6 credits)
Select at least 6 credits, in consultation with the advisor, from one or more of the following areas. Other courses may be applied to this requirement with advisor approval. PSY 8960, if selected, must be one of the identified topics sections or another topic offered through the I-O psychology area.

I-O Psychology (0 to 6 credits)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
  Seminar in Psych - Meta-Analysis

Seminar in Psych - Fairness and Bias
Seminar in Psych - Personality at Work
Seminar in Psych - Motivation at Work
Seminar in Psych - Counterproductive Work Behaviors

Psychology (0 to 6 credits)
PSY courses at the 5xxx and 8xxx level may be used with advisor approval.

Related Disciplines (0 to 6 credits)
Coursework may include 5xxx and 8xxx level courses in EPSY, STAT, APEC, CSOM, and/or LAW.

Supporting Quantitative Concentration Coursework (12 credits)
Additional Supporting Concentrations or Minor Coursework may be undertaken with advisor approval.

Quantitative Methods (9 credits)
Take each of the following required PSY 8960 topics courses for 3 credits. Other courses may be substituted with advisor approval.
PSY 8960: Research Methods in I-O Psychology
PSY 8960: Data Science
PSY 8960: Multivariate

Additional Quantitative Coursework (3 credits)
Select 3 credits from the following in consultation with the advisor. Other courses can be substituted with advisor approval.

- EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
- PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
- PSY 8968 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)

Personality, Individual Differences and Behavior Genetics
Students without the master's upon matriculation must complete the University's Psychology MA degree (thesis option) or equivalent master's degree with advisor and director of graduate studies approval.

Required Courses (14 credits)
Take the following courses:

- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
- PSY 8814 - Analysis of Psychological Data (4.0 cr)
- PSY 8815 - Analysis of Psychological Data (4.0 cr)

Core Electives (6 credits)
Select 6 credits from the following in consultation with the advisor:

- PSY 5101H - Honors: Personality: Current Theory and Research (3.0 cr)
- PSY 5135 - Psychology of Individual Differences (3.0 cr)
- PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
- PSY 8664 - Personality Assessment (3.0 cr)

Statistics Electives (3 credits)
Select 3 credits from the following in consultation with the advisor:

- PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
- PSY 8881 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
- PSY 8882 - Seminar: Quantitative and Psychometric Methods (3.0 cr)

Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor approval. Under limited circumstances, this requirement can be waived with advisor and area director approval for students who elect to pursue a formal minor.

- PSY 5136 - Human Abilities (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
- PSY 8937 - Seminar in Human Behavioral Genetics (3.0 cr)

Quantitative/Psychometric Methods

Required Courses (30 credits)
Take the following courses. Take 21 total credits of PSY 8881 and 8882, in consultation with the advisor. Take 3 credits of PSY 8960 Seminar: Multivariate Statistics for Social Scientists.

- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
- PSY 8881 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
- PSY 8882 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)

Statistics Courses (6 credits)
Select one of the following course sequences in consultation with the advisor:

- PSY 8814 - Analysis of Psychological Data (4.0 cr)
- PSY 8815 - Analysis of Psychological Data (4.0 cr)
Take either STAT 5101 and STAT 5102 or STAT 8101 and STAT 8102.

- **STAT 5101** - Theory of Statistics I (4.0 cr)
- or **STAT 5102** - Theory of Statistics II (4.0 cr)
- or **Sub-list 0**
  - **STAT 8101** - Theory of Statistics 1 (3.0 cr)
  - **STAT 8102** - Theory of Statistics 2 (3.0 cr)

**General Psychology Courses (3 credits)**

Select at least 3 credits from the following in consultation with the advisor. PSY 5993 and PSY 8993 coursework cannot be applied to this requirement.

- CPSY 5xxx
- CPSY 8xxx
- PSY 5xxx
- PSY 8xxx

**Electives (6 credits)**

Select 6 credits from the following in consultation with the advisor. Application of PSY 8960 credits to this requirement is strongly encouraged.

- PSY 8960: Computerized Adaptive Testing (3.0 cr)

- PSY 8960: Item Response Theory (3.0 cr)
- PSY 8960: Multilevel Modeling (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- MATH 5447 - Theoretical Neuroscience (4.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7460 - Advanced Statistical Computing (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 5701 - Statistical Computing (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
- STAT 8053 - Advanced Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)

**Social Psychology**

**Required Courses (17 credits)**

Take the following courses. Take Psy 8205 twice for a total of 6 credits. Take Psy 8206 at least 3 times for a total of 3 credits.

- PSY 8205 - Principles of Social Psychology (3.0 cr)
- PSY 8206 - Proseminar in Social Psychology (1.0 cr)
- PSY 8814 - Analysis of Psychological Data (4.0 cr)
- PSY 8815 - Analysis of Psychological Data (4.0 cr)

**Advanced Statistics Courses (3 credits)**

Select at least 3 credits from the following in consultation with the advisor.

- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5865 - Advanced Measurement: Theory and Application (3.0 cr)
- PSY 8882 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Electives (12 credits)
Select at least 12 credits, at least 6 of which must be from 8000-level courses, from the following in consultation with the advisor:
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 5205 - Applied Social Psychology (3.0 cr)
PSY 5206 - Social Psychology and Health Behavior (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 8201 - Social Cognition (3.0 cr)
PSY 8203 - Impression Management (3.0 cr)
PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PSY 8210 - Law, Race, and Social Psychology (3.0 cr)

Additional Psychology Course (3 credits)
Select at least 3 credits from the following in consultation with the advisor. PSY 5993, PSY 52xx, and PSY 82xx courses cannot be applied to this requirement.
PSY 5xxx
PSY 8xxx
Twin Cities Campus
Race, Indigeneity, Disability, Gender, and Sexuality Minor
Anthropology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Race, Indigeneity, Disability, Gender & Sexuality Studies Initiative
310 Scott Hall
72 Pleasant St SE
Minneapolis, MN 55455
612-626-1313
Email: ridgs@umn.edu
Website: https://cla.umn.edu/ridgs

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The RIDGS graduate minor is the critical and comparative study of significant social categories of power and inequality, namely race, ethnicity, indigeneity, disability, gender, sexuality, class, sovereignty, and diaspora. This interdisciplinary minor foregrounds a transnational and comparative framework to analyze these multiple forms of social difference and their interactions in relation to one another. While the focus is on the United States, given the minor’s attention to the making of social categories and borders, the analytical lens and purview of the minor will be transnational in scale and scope.

Seminars in the minor are grounded by a strong commitment to the analysis and understanding of power relations, structural inequality, and social justice through a relational and multidisciplinary approach. The RIDGS graduate minor focuses on the processes that constitute the categories and groups in the first place, rather than juxtaposing discrete groups, and offers tools for theorizing their mutual constitution. Accordingly, this graduate minor privileges intersectionality, interdisciplinary, transnationalism, comparison, and relationality. What distinguishes this graduate minor is its conceptual and theoretical approach, which not only makes this program complementary to existing graduate courses of study at UMN, but also engages multiscalar justice and equity discourses, in historical and contemporary perspectives.

The RIDGS graduate minor strengthens student work in their major field of study as students learn how best to integrate critical and comparative race, ethnicity, indigeneity, disability, gender and sexuality theories and methodologies into their existing work.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Race, Indigeneity, Gender, Disability, and Sexuality (RIDGS) director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses offered for variable credit must be taken for 3 credits and any 4xxx-level coursework requires pre-approval by the RIDGS director of graduate studies.
The minimum cumulative GPA for minor field coursework is 3.00.

**Proseminar (3 credits)**
Select 1 of the following courses in consultation with the RIGS director of graduate studies. If HIST 8910 Topics is chosen, take Race and Class in the United States for 3 credits.
- AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
- HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
- SOC 8211 - The Sociology of Race & Racialization (3.0 cr)

**Electives (3-6 credits)**
Master's students select 3 credits, and doctoral students select 6 credits in consultation with the RIDGS director of graduate studies. Topics courses must be taken for 3 credits in the section noted: AMIN 8910 Amlnd & Indigenous Studies; ANTH 8510 Decolonizing Archives; ANTH 8810 Anthro of Capitalism; HIST 5910 Am Colonial & Indigenous Hist; HIST 5910 Intersect of Native & AfrAm Hist; HIST 8910 Race & Class in US; HIST 8960 Politics of Land; HIST 8970 W. Imperialisms; POL 8260 Theorizing Violence; SOC 8090 Soc of Black Exp; SOC 8190 Genocide & Mass Violence.
- AFRO 5666 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
- AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
- AMIN 5402 - American Indians and the Cinema [AH, DSJ] (3.0 cr)
- AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
- AMIN 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
- AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
- AMIN 5920 - Topics in American Indian Studies (3.0 cr)
- AMIN 8301 - Critical Indigenous Theory (3.0 cr)
- AMIN 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
- AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- ANTH 8510 - Topics in Archaeology (3.0 cr)
- ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
- CHIC 5374 - Migrant Farmworkers in the United States: Families, Work, and Advocacy [CIV] (4.0 cr)
- CI 8416 - Speculative Fiction, Radical Imagination, and Social Change (3.0 cr)
- CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- GWSS 5104 - Transnational Feminist Theory (3.0 cr)
- GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
- HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)
- HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8960 - Topics in History (1.0 - 4.0 cr)
- HIST 8970 - Advanced Research in Quantitative History (3.0 cr)
- HSPH 8003 - Race and Indigeneity in Heritage Representation (3.0 cr)
- PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)
- PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)
- POL 8260 - Topics in Political Theory (3.0 cr)
- SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
- SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
- SOC 8211 - The Sociology of Race & Racialization (3.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral**

**Interdisciplinary Methodologies (3 credits)**
Doctoral minors select 1 of the following courses in consultation with the RIDGS director of graduate studies:
- AMST 8289 - Ethnographic Research Methods: Research Strategies in American Studies (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- COMM 8110 - Seminar: Communication Research Methods (3.0 cr)
- GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
Twin Cities Campus

Religious Studies Minor
Classical and Near Eastern Religions and Cultures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Religious Studies Program, 245 Nicholson Hall, 216 Pillsbury Avenue S.E., Minneapolis, MN 55455 (612-625-6393)
Email: rels@umn.edu
Website: https://cla.umn.edu/religious-studies/graduate

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in Religious Studies is available to master's and doctoral students in relevant University of Minnesota departments, schools, and colleges, including but not limited to American Studies, Anthropology, Art History, Classical and Near Eastern Studies, English, History, Philosophy, Sociology, Hubbard School of Journalism and Mass Communication, School of Music, and the College of Education and Human Development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Religious Studies director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All coursework applied to the minor must be taken on the A-F grade basis.

Required Course (3 credits)
Take the following course:
RELS 5001 - Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion (3.0 cr)

Electives (6 to 9 credits)
Masters students select 6 credits, and doctoral students select 9 credits from the following in consultation with the Religious Studies director of graduate studies. Other courses can be applied to this requirement with approval of the Religious Studies director of graduate studies.
RELS 5013W - Biblical Law and Jewish Ethics [WI] (3.0 cr)
RELS 5071 - Greek and Hellenistic Religions (3.0 cr)
RELS 5115 - Midrash: Reading and Retelling the Hebrew Bible (3.0 cr)
RELS 5204 - The Dead Sea Scrolls (3.0 cr)
RELS 5254 - Archaeology of Ritual and Religion (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Rhetoric, Scientific and Technical Communication M.A.
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 Nolte Center, 315 Pillsbury Drive, SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: writgpc@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Writing Studies trains students to understand how people use written communication (textual, digital, and visual) to shape the world around them, with a particular emphasis on communication in scientific and technical areas. The MA program prepares students for doctoral-level research by training them in the areas of rhetorical theory and history; writing studies and pedagogy; and technical communication, technology, and culture. Students build a broad base of knowledge in these three areas while developing a specialty area and pursuing interdisciplinary study.

MA applicants should have a strong interest in language and rhetorical theory or communication theory. Students often benefit from entering the program with a background in a science, Internet studies, environmental studies, or pedagogy and technology. Students work in collaboration with faculty mentors and peers to develop the expertise required to make original contributions to the scholarship in their field. The curriculum, professional development training, and funding are structured to support students in making early and regular contributions to the published literature, and in teaching first-year writing and advanced writing courses at the college level.

Each student also develops a supporting field or minor by taking courses outside the department. Students often build expertise in such areas as communication studies; curriculum and instruction; history of science and technology; history of medicine; or gender, women's and sexuality studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Undergraduate degree in a related discipline such as rhetoric, technical and professional communication, English, or communication studies.

Special Application Requirements:
Nonnative speakers of English are required to take an appropriate test with satisfactory scores. All applicants must submit a departmental supplemental application, personal statement, curriculum vitae or resume, three letters of recommendation and two writing samples. Applicants are also strongly encouraged to submit a diversity statement and, if appropriate, an extenuating circumstances statement. All MA applicants should apply by the January 5 application deadline; all admitted students begin in the fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required. 
Capstone Project: The Plan B project requires students to complete a publication-worthy research paper under their advisors supervision.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each course.

Required Core Area (12 credits)
Select a total of 12 credits from the following 3 categories:

Rhetoric (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
- WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
- WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)

Writing Studies (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
- WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
- WRIT 8560 - Seminar in Writing Studies (3.0 cr)

Technical Communication (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
- WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)

Methods and Pedagogies (7 credits)
Take the following courses:
- WRIT 8011 - Research Methods in Writing Studies and Technical Communication (3.0 cr)
- WRIT 5531 - Introduction to Writing Theory and Pedagogies (3.0 cr)
- WRIT 5532 - Practicum in Writing Pedagogies (1.0 cr)

Writing Studies Specialty Area (6 credits)
Courses should be selected to develop a coherent specialty area/concentration. Specialties include areas such as rhetoric, literacies, professional and technical communication, internet studies, theories of writing, writing pedagogies, rhetorics of science, medicine, or law, and the environment.
- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 5501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
- WRIT 5662 - Writing With Digital Technologies (3.0 cr)
- WRIT 5664 - Science, Medical, and Health Writing (3.0 cr)
- WRIT 5671 - Visual Rhetoric (3.0 cr)
- WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
- WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)
- WRIT 8505 - Professional Practice (3.0 cr)
- WRIT 8510 - Seminar in Rhetoric (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
- WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
- WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)
- WRIT 8560 - Seminar in Writing Studies (3.0 cr)
- WRIT 8792 - Independent Study, Reading, and Research (1.0 - 4.0 cr)
Outside Coursework (6 credits)
Select 6 credits outside the Department of Writing Studies in consultation with the advisor. Other courses can be applied to this requirement with advisor approval.
AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
BTHX 5300 - Foundations of Bioethics (3.0 cr)
BTHX 8xxx
CI 5xxx
CI 8xxx
COMM 5xxx
COMM 8xxx
ENGL 5xxx
ENGL 8xxx
GWSS 5xxx
GWSS 8xxx
HMED 5xxx
HMED 8xxx
HSCI 5xxx
HSCI 8xxx
IDSC 6xxx
IDSC 8xxx
OLPD 5xxx
OLPD 8xxx
PUBH 6414 - Biostatistical Literacy (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Plan B Project Credits (3 credits)
Take 3 credits of the following in consultation with the advisor:
WRIT 8794 - Directed Research (1.0 - 4.0 cr)
Twin Cities Campus
Rhetoric, Scientific and Technical Communication Minor
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 Nolte Center, 315 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: writgpc@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Graduate Minor in Rhetoric and Scientific & Technical Communication (RSTC) is available for masters and PhD-level students enrolled in other University graduate programs. Courses train students to understand how people use written communication (textual, digital, and visual) to shape the world around them, with a particular emphasis on communication in scientific and technical areas. The minor also offers students opportunities to pursue special interests in areas such as digital, textual, or visual literacies; theories of rhetoric; writing; composition; and writing pedagogies.

Tailored to students in research degree programs, the minor prepares students to integrate writing pedagogy into discipline-specific teaching practices, develop skills in rhetorical analysis, apply scientific and technical communication principles to the communication of scholarly work, and more. Students in graduate-level professional programs who are interested in applying basic theory and research-driven approaches to workplace contexts are encouraged to pursue the Scientific and Technical Communication Minor.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Rhetoric, Scientific and Technical Communication director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each course.

The minimum cumulative GPA for minor field coursework is 3.00.

Methods, Pedagogies, and Core Areas (6 credits)
Masters students select 6 credits, and doctoral students select 6 or more credits from the following in consultation with the Rhetoric, Scientific and Technical Communication director of graduate studies.

- WRIT 5531 - Introduction to Writing Theory and Pedagogies (3.0 cr)
- WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
- WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)
- WRIT 8011 - Research Methods in Writing Studies and Technical Communication (3.0 cr)
- WRIT 8510 - Seminar in Rhetoric (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)
WRIT 8560 - Seminar in Writing Studies (3.0 cr)

Electives
Select coursework in consultation with the Rhetoric, Scientific and Technical Communication director of graduate studies.
WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
WRIT 5270 - Special Topics (3.0 cr)
WRIT 5532 - Practicum in Writing Pedagogies (1.0 cr)
WRIT 5662 - Writing With Digital Technologies (3.0 cr)
WRIT 5664 - Science, Medical, and Health Writing (3.0 cr)
WRIT 5671 - Visual Rhetoric (3.0 cr)
WRIT 8792 - Independent Study, Reading, and Research (1.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Rhetoric, Scientific and Technical Communication Ph.D.
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 Nolte Center, 315 Pillsbury Drive, SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: writgpc@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 67
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Writing Studies trains students to understand how people use written communication (textual, digital, and visual) to shape the world around them, with a particular emphasis on communication in scientific and technical areas. The PhD program prepares students to become researchers and teachers with expertise in rhetoric, writing studies, and technical communication. Students in the RSTC program also pursue special interests in areas such as digital, textual, or visual literacies; rhetorics of science, health, medicine, law, and/or the environment; professional communication; internet studies; theories of writing; composition; and writing pedagogies.

Students work in collaboration with faculty mentors and peers to develop the expertise required to make original contributions to the scholarship in their fields. The curriculum, professional development training, and funding are structured to support students in making early and regular contributions to the published literature, and in teaching first-year writing and advanced writing courses at the college level. Most graduates of the program pursue careers teaching at the college level, although some have developed careers in industry or non-governmental organizations.

Each student also develops a supporting program of courses outside the department. Coursework outside the department is commonly pursued in fields such as communication studies; curriculum and instruction; history of medicine; or gender, women's and sexuality studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Master's in a related discipline, e.g., rhetoric, technical and professional communication, English, communication studies.

Other requirements to be completed before admission:
Individuals who do not yet have a masters degree in a related discipline are encouraged to apply to Writing Studies Rhetoric, Scientific and Technical Communication MA. Students in the MA program who are making satisfactory progress will, in their second year of study, have the opportunity to apply to the PhD program. For students who continue in the program, most MA courses transfer to the PhD. Continuing students must complete their MA no later than the end of the first semester in the PhD program.

Special Application Requirements:
Nonnative speakers of English are required to take an appropriate test with satisfactory scores. All applicants must submit a departmental supplemental application, personal statement, curriculum vitae or resume, three letters of recommendation and two writing samples. Applicants are also strongly encouraged to submit a diversity statement and, if appropriate, an extenuating circumstances statement. All PhD applicants should apply by the January 5 application deadline; all admitted students begin in the fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
Program Requirements
31 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Up to 6 credits from a master's program, upon consultation with the advisor and approval of the director of graduate studies, can be applied to the PhD.

All coursework offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B earned for each.

Students must write a formal prospectus outlining the plan for their dissertation and present it to committee members within a year of passing the preliminary oral exam. Upon committee approval of the prospectus, the student must obtain their advisor's signature on the prospectus form and file it with the department's graduate studies office.

Required Core Areas (15 credits)
Select a total of 15 credits from the following three categories:

Rhetoric (6 to 9 credits)
Select at least 6 credits from the following in consultation with the advisor:
- WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
- WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)
- WRIT 8510 - Seminar in Rhetoric (3.0 cr)

Writing Studies (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
- WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
- WRIT 8560 - Seminar in Writing Studies (3.0 cr)

Technical Communication (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
- WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)

Methods and Pedagogies (7 credits)
Take the following courses:
- WRIT 8011 - Research Methods in Writing Studies and Technical Communication (3.0 cr)
- WRIT 5531 - Introduction to Writing Theory and Pedagogies (3.0 cr)
- WRIT 5532 - Practicum in Writing Pedagogies (1.0 cr)

Writing Studies Specialty Area (9 credits)
Courses should be selected to develop a coherent specialty area/concentration. Specialties include areas such as rhetoric, literacies, professional and technical communication, internet studies, theories of writing, writing pedagogies, rhetorics of science, medicine, or law, and the environment.

Writing Studies Courses (9 credits)
Select at least 9 credits from the following in consultation with the advisor:

- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 5501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
- WRIT 5662 - Writing With Digital Technologies (3.0 cr)
- WRIT 5664 - Science, Medical, and Health Writing (3.0 cr)
- WRIT 5671 - Visual Rhetoric (3.0 cr)
- WRIT 5775 - Rhetorical Traditions: Classical Period (3.0 cr)
- WRIT 5776 - The Rhetorical Traditions: Modern Era (3.0 cr)
- WRIT 8505 - Professional Practice (3.0 cr)
- WRIT 8510 - Seminar in Rhetoric (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
- WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
- WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)
- WRIT 8560 - Seminar in Writing Studies (3.0 cr)
- WRIT 8792 - Independent Study, Reading, and Research (1.0 - 4.0 cr)
- WRIT 8794 - Directed Research (1.0 - 4.0 cr)

Outside Coursework (12 credits)
Select at least 12 credits of outside coursework from the following, in consultation with the advisor to form a coherent supporting program. Other courses may be applied to this requirement with advisor approval.

- AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
- BTHX 5300 - Foundations of Bioethics (3.0 cr)
- BTHX 8xxx
- CI 5xxx
- CI 8xxx
- COMM 5xxx
- COMM 8xxx
- ENGL 5xxx
- ENGL 8xxx
- GWSS 5xxx
- GWSS 8xxx
- HMED 5xxx
- HMED 8xxx
- HSCI 5xxx
- HSCI 8xxx
- IDSC 5xxx
- IDSC 8xxx
- OLPD 5xxx
- OLPD 8xxx
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)

Thesis Credits
Take 24 or more credit(s) from the following:

- WRIT 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Scientific and Technical Communication M.S.
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 Nolte Center, 315 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Writing Studies trains students to understand how people use written communication (digital, visual, textual) to shape the world around them, with a particular emphasis on communication in scientific and technical areas. The MS in Scientific and Technical Communication focuses on applying basic theory and research-driven approaches to the creation and adaptation of content to solve complex problems in technical communication workplaces. Students connect with workplace professionals through client projects, virtual and global teamwork, mentorships, and emerging technologies. These experiences enable students to develop unique strengths in digital, usability, and science/health/medical communication.

MS courses are taught by graduate faculty who themselves have active research agendas in these areas. Students also have the opportunity to work with the Technical Communication Advisory Board (TCAB), a group of business leaders who provide pathways to experiential learning opportunities including networking, mentoring, and internships.

This fully online program equips professionals for transition to the technical communication field and/or for specialized study tailored to career goals. All coursework from the Certificate in Technical Communication program can be applied to the MS.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 21 major credits and 9 credits outside the major. The is no final exam. A capstone project is required.
Capstone Project: WRIT 8505, the capstone course, provides a structured setting for students to complete a research project that will position them for applied work in technical communication.

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Information current as of November 07, 2022
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

All coursework must be taken for an A-F grade and completed with a minimum grade of B-, unless the course is only offered for an S/N grade.

**Core Coursework (15 credits)**

Take the following courses for a total of 15 credits.

- WRIT 5001 - Introduction to Graduate Studies in Scientific and Technical Communication (3.0 cr)
- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 5501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
- WRIT 5662 - Writing With Digital Technologies (3.0 cr)

**Capstone Course (3 credits)**

Take the following course:

- WRIT 8505 - Professional Practice (3.0 cr)

**Electives (3 credits)**

Take at least 3 credits of electives, selected in consultation with the advisor or director of graduate studies. Under some circumstances, 3 credits of independent study (WRIT 5291) or internship (WRIT 5196) may be substituted with the director of graduate studies approval.

- WRIT 4562 - International Professional Communication (3.0 cr)
- WRIT 4573W - Writing Proposals and Grant Management [WI] (3.0 cr)
- WRIT 5664 - Science, Medical, and Health Writing (3.0 cr)

**Outside Coursework (9 credits)**

Select at least 9 credits outside the Department of Writing Studies, in consultation with the advisor or director of graduate studies. Courses can be from the following list or others with approval of the advisor or director of graduate studies. Note: CI 5106, CI 5351, CI 5474, GDES 5372, MOT 5001, and MOT 5002 are not offered online.

- CI 5106 - Multicultural Teaching and Learning in Diverse College Contexts (3.0 cr)
- CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
- CI 5301 - Foundations of Computer Applications for Business and Education (3.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- CI 5323 - Online Learning Communities (3.0 cr)
- CI 5325 - Designing and Developing Online Distance Learning (3.0 cr)
- CI 5331 - Introduction to Learning Technologies (3.0 cr)
- CI 5336 - Planning for Multimedia Design and Development (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5362 - Foundations of Interactive Design for Web-based Learning (3.0 cr)
- CI 5371 - Learning Analytics: Theory and Practice (3.0 cr)
- CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)
- COMM 5441 - Communication in Human Organizations (3.0 cr)
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- HINF 5430 - Foundations of Health Informatics I (3.0 cr)
- HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
- KIN 5202 - Current Issues in Health (2.0 cr)
- MOT 5001 - Technological Business Fundamentals (2.0 cr)
- MOT 5002 - Creating Technological Innovation (2.0 cr)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>NURS 5115</td>
<td>Interprofessional Health Care Informatics (3.0 cr)</td>
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<td>NURS 5116</td>
<td>Consumer Health Informatics (2.0 cr)</td>
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<td>NURS 7118</td>
<td>Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)</td>
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<td>OLPD 5201</td>
<td>Strategies for Teaching Adults (3.0 cr)</td>
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<td>OLPD 5501</td>
<td>Principles and Methods of Evaluation (3.0 cr)</td>
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<td>Organization Development (3.0 cr)</td>
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<td>International Human Resource Development (3.0 cr)</td>
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<td>Instructional Design for e-Learning (3.0 cr)</td>
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<td>Applied Medical Terminology (2.0 cr)</td>
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<td>PHAR 5700</td>
<td>Applied Fundamentals of Pharmacotherapy (3.0 cr)</td>
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<td>PUBH 6724</td>
<td>The Health Care System and Public Health (3.0 cr)</td>
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<td>PUBH 6735</td>
<td>Principles of Health Policy (3.0 cr)</td>
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<td>PUBH 6741</td>
<td>Ethics in Public Health: Professional Practice and Policy (1.0 cr)</td>
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<tr>
<td>PUBH 7710</td>
<td>Setting Priorities and Framing Public Health Issues (2.0 cr)</td>
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Twin Cities Campus
Scientific and Technical Communication Minor
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Dr SE, Minneapolis, MN 55455; (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: https://cla.umn.edu/writing-studies

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 6
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Scientific and Technical Communication minor is available for masters-level students enrolled in other University graduate programs. Courses train students to apply basic theory and research-driven approaches to create and adapt content to solve complex problems in technical and scientific communication. The minor offers online courses in areas such as editing and style, writing with digital technologies, information design, and international professional communication. Coursework emphasizes collaboration with workplace professionals through client projects, virtual and global teamwork, mentorships, and emerging technologies and enables students to develop unique strengths in digital, usability, and/or science/health/medical communication.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Scientific and Technical Communication director of graduate studies, regarding feasibility and requirements. Research master's and PhD students interested in rhetorical theory and history, technical communication, technology and culture, digital and new media studies, and writing pedagogy are encouraged to pursue the Rhetoric, Technical and Scientific Communication minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum grade of B- is required for all courses applied to the minor, unless the course is only offered S/N. The overall minimum GPA is 2.80.

Coursework (6 credits)
Core Course (3 credits)
Take 3 credits of the following:
WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
Electives (3 credits)
Take 3 credits of electives. Courses can be from the following list or others with approval of the director of graduate studies. Note 4000-level courses are only acceptable if there is not a 5000-level option.
WRIT 4562 - International Professional Communication (3.0 cr)
WRIT 4573W - Writing Proposals and Grant Management [WI] (3.0 cr)
WRIT 5501 - Usability and Human Factors in Technical Communication (3.0 cr)
WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
WRIT 5662 - Writing With Digital Technologies (3.0 cr)
WRIT 5664 - Science, Medical, and Health Writing (3.0 cr)
WRIT 8505 - Professional Practice (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Twin Cities Campus  
Sociology M.A.  
Sociology  
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:  
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)  
Email: soc@umn.edu  
Website: http://cla.umn.edu/sociology/graduate

- Program Type: Master's  
- Requirements for this program are current for Fall 2022  
- Length of program in credits: 32 to 33  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Sociology graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Sociology PhD program.

Program Delivery
This program is available:  
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Note: The Sociology graduate program does not accept applications directly to the MA; rather, the MA is an additional or alternative credential for students admitted to the Sociology PhD program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 17 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grade basis must be taken A-F with a minimum grade of B earned for each course.

Core Courses (14 Credits)
Take the following courses. Take SOC 8001 twice for a total of 2 credits.  
SOC 8001 - Sociology as a Profession (1.0 cr)  
SOC 8701 - Sociological Theory (4.0 cr)  
SOC 8801 - Sociological Research Methods (4.0 cr)  
SOC 8811 - Advanced Social Statistics (4.0 cr)

Qualitative Elective Coursework (3 credits)
Select one of the following courses.
SOC 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
SOC 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
SOC 8853 - Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor.
AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
AMST 8920 - Topics in American Studies (3.0 cr)
ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
GEOG 8230 - Theoretical Geography (3.0 cr)
GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
GEOG 8294 - Spatiotemporal Modeling and Simulation (3.0 cr)
GEOG 8970 - Directed Readings (1.0 - 5.0 cr)
GEOG 8980 - Topics: Geography (1.0 - 3.0 cr)
GLOS 5403 - Human Rights Advocacy (3.0 cr)
GLOS 5900 - Topics in Global Studies (1.0 - 4.0 cr)
GRAD 8401 - Dissertation Proposal Development Seminar (3.0 cr)
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
GWSS 8109 - Feminist Knowledge Production (3.0 cr)
GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
GWSS 8270 - Seminar: Theories of Body (3.0 cr)
GWSS 8995 - Directed Research (1.0 - 8.0 cr)
HIST 5890 - Readings in American Indian and Indigenous History (3.0 cr)
HIST 5902 - Latin America Proseminar: Modern (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8900 - Topics in European/Medieval History (1.0 - 4.0 cr)
HIST 8910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8970 - Advanced Research in Quantitative History (3.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
JOUR 8503 - Advanced Qualitative Methods in Mass Communication Research (3.0 cr)
KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
LAW 6846 - Philosophy of Punishment (3.0 cr)
LAW 6889 - Laws of War (3.0 cr)
LING 5900 - Topics in Linguistics (3.0 cr)
OLPD 5103 - Comparative Education (3.0 cr)
OLPD 8095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
PA 5451 - Inactive
PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
PA 8151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 8312 - Analysis of Discrimination (4.0 cr)
PA 8331 - Economic Demography (3.0 cr)
PA 8390 - Advanced Topics in Advanced Policy Analysis Methods (1.0 - 3.0 cr)
PA 8461 - Global and U.S. Perspectives on Health and Mortality (3.0 cr)
PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)
PHIL 8310 - Seminar: Moral Philosophy (3.0 cr)
POL 8160 - Topics in Models and Methods (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)
PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
PSY 8205 - Principles of Social Psychology (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
Plan Options

Plan A
Plan A students take 10 master's thesis credits.
SOC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Plan B students select coursework from the following in consultation with the advisor:
SOC 5090 - Topics in Sociology (1.0 - 3.0 cr)
SOC 5104 - Crime and Human Rights (3.0 cr)
SOC 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
SOC 5411 - Terrorist Networks & Counterterror Organizations (3.0 cr)
SOC 5446 - Comparing Healthcare Systems [GP] (3.0 cr)
SOC 5455 - Sociology of Education (3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8093 - Directed Study (1.0 - 4.0 cr)
SOC 8094 - Directed Research (1.0 - 4.0 cr)
SOC 8101 - Sociology of Law (3.0 cr)
SOC 8111 - Criminology (3.0 cr)
SOC 8171 - Cross-Disciplinary Perspectives in Human Rights (3.0 cr)
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
SOC 8221 - Sociology of Gender (3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
SOC 8311 - Political Sociology (3.0 cr)
SOC 8390 - Topics in Political Sociology (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8490 - Advanced Topics in Social Organization (3.0 cr)
SOC 8501 - Sociology of the Family (3.0 cr)
SOC 8540 - Topics in Family Sociology (3.0 cr)
SOC 8551 - Life Course Inequality & Health (3.0 cr)
SOC 8590 - Topics in Life Course Sociology (3.0 cr)
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)
SOC 8731 - Sociology of Knowledge (3.0 cr)
SOC 8735 - Sociology of Culture (3.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
SOC 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
SOC 8853 - Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
Twin Cities Campus

Sociology Minor

Sociology

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Ave S, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://cla.umn.edu/sociology/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Through the exploration of social and individual dynamics, we prepare our students to enrich social scientific understandings of the complex problems societies face today. Research specialties include:
1. Demography, family, and life course
2. Global, transnational, and comparative sociology
3. Inequalities and culture
4. Law, crime, punishment, and human rights

Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Sociology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

Courses applied to the minor must be approved by the Sociology director of graduate studies.

Courses applied to the minor that are offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B earned for each.

The minimum cumulative GPA for minor field coursework is 3.00.

Coursework (6 to 12 credits)
Master's students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Sociology director of graduate studies:

SOC 5090 - Topics in Sociology (1.0 - 3.0 cr)
SOC 5104 - Crime and Human Rights (3.0 cr)
SOC 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
SOC 5411 - Terrorist Networks & Counterterror Organizations (3.0 cr)
SOC 5446 - Comparing Healthcare Systems [GP] (3.0 cr)
SOC 5455 - Sociology of Education (3.0 cr)
SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
SOC 8093 - Directed Study (1.0 - 4.0 cr)
SOC 8094 - Directed Research (1.0 - 4.0 cr)
SOC 8101 - Sociology of Law (3.0 cr)
SOC 8111 - Criminology (3.0 cr)
SOC 8171 - Cross-Disciplinary Perspectives in Human Rights (3.0 cr)
SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
SOC 8221 - Sociology of Gender (3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
SOC 8311 - Political Sociology (3.0 cr)
SOC 8390 - Topics in Political Sociology (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8490 - Advanced Topics in Social Organization (3.0 cr)
SOC 8501 - Sociology of the Family (3.0 cr)
SOC 8540 - Topics in Family Sociology (3.0 cr)
SOC 8551 - Life Course Inequality & Health (3.0 cr)
SOC 8590 - Topics in Life Course Sociology (3.0 cr)
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)
SOC 8731 - Sociology of Knowledge (3.0 cr)
SOC 8735 - Sociology of Culture (3.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
SOC 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
SOC 8853 - Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Sociology Ph.D.
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://cla.umn.edu/sociology/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 65
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Through the exploration of social and individual dynamics, students are prepared to enrich social scientific understandings of the complex problems societies face today. Research specialties include:

1. Demography, family, and life course
2. Global, transnational, and comparative sociology
3. Inequalities and culture
4. Law, crime, punishment, and human rights

Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research. The doctoral program is for students planning to do research or teach.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
An earned graduate or professional degree is not required for admission.

It is recommended that applicants have a background in basic sociology, usually consisting of the equivalent of 18 credits in undergraduate work (including 9 credits of social science statistical methods), or an MA degree in sociology or a closely related field. Individuals without sociology coursework are generally required to complete background coursework in theory and statistics during their first year of residence; such coursework cannot be applied to doctoral credit requirements.

Special Application Requirements:
Applicants are evaluated on their academic potential, commitment to the field, creativity, and potential for contribution to the field. In addition to the University application form, and its required documents, applicants must submit the following: GRE scores: a sample of written work, usually a term paper, written in English; three letters of recommendation; and a personal statement of professional objectives. Non-native English speakers are required to take the TOEFL test, this includes students who have studied in the U.S. The department accepts new students for fall admission only. The application deadline is December 15.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Listening Score: 22
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
29 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Coursework offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B earned for each course.

Core Courses (14 Credits)
Take the following courses. Take SOC 8001 twice for a total of 2 credits.
SOC 8001: Sociology as a Profession (1.0 cr)
SOC 8701: Sociological Theory (4.0 cr)
SOC 8801: Sociological Research Methods (4.0 cr)
SOC 8811: Advanced Social Statistics (4.0 cr)

Advanced Qualitative Research Methods (3 credits)
Take one of the following courses.
SOC 8851: Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)
SOC 8852: Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
SOC 8853: Advanced Qualitative Research Methods: Historical & Comparative Sociology (3.0 cr)

Sociology Electives (12 Credits)
Select elective coursework in consultation with the advisor.
SOC 5090: Topics in Sociology (1.0 - 3.0 cr)
SOC 5104: Crime and Human Rights (3.0 cr)
SOC 5315: Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
SOC 5411: Terrorist Networks & Counterterror Organizations (3.0 cr)
SOC 5446: Comparing Healthcare Systems [GP] (3.0 cr)
SOC 5455: Sociology of Education (3.0 cr)
SOC 5809: Topics in Sociology (1.5 - 3.0 cr)
SOC 5893: Directed Study (1.0 - 4.0 cr)
SOC 5894: Directed Research (1.0 - 4.0 cr)
SOC 8010: Sociology of Law (3.0 cr)
SOC 8101: Sociology of the Family (3.0 cr)
SOC 8111: Criminology (3.0 cr)
SOC 8171: Cross-Disciplinary Perspectives in Human Rights (3.0 cr)
SOC 8190: Topics in Law, Crime, and Deviance (3.0 cr)
SOC 8211: The Sociology of Race & Racialization (3.0 cr)
SOC 8221: Sociology of Gender (3.0 cr)
SOC 8290: Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
SOC 8311: Political Sociology (3.0 cr)
SOC 8390: Topics in Political Sociology (3.0 cr)
SOC 8412: Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8490: Advanced Topics in Social Organization (3.0 cr)
SOC 8501: Sociology of the Family (3.0 cr)
SOC 8540: Topics in Family Sociology (3.0 cr)
SOC 8551: Life Course Inequality & Health (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>SOC 8590</td>
<td>Topics in Life Course Sociology (3.0 cr)</td>
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<tr>
<td>SOC 8607</td>
<td>Migration &amp; Migrants in Demographic Perspective (3.0 cr)</td>
</tr>
<tr>
<td>SOC 8701</td>
<td>Sociological Theory (4.0 cr)</td>
</tr>
<tr>
<td>SOC 8721</td>
<td>Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)</td>
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<tr>
<td>SOC 8731</td>
<td>Sociology of Knowledge (3.0 cr)</td>
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<tr>
<td>SOC 8735</td>
<td>Sociology of Culture (3.0 cr)</td>
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<tr>
<td>SOC 8790</td>
<td>Advanced Topics in Sociological Theory (3.0 cr)</td>
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<tr>
<td>SOC 8801</td>
<td>Sociological Research Methods (4.0 cr)</td>
</tr>
<tr>
<td>SOC 8811</td>
<td>Advanced Social Statistics (4.0 cr)</td>
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<tr>
<td>SOC 8851</td>
<td>Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)</td>
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<tr>
<td>SOC 8852</td>
<td>Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)</td>
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<td>SOC 8853</td>
<td>Advanced Qualitative Research Methods: Historical &amp; Comparative Sociology (3.0 cr)</td>
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<tr>
<td>SOC 8890</td>
<td>Advanced Topics in Research Methods (2.0 - 3.0 cr)</td>
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</table>

**Outside Coursework (12 credits)**

Select 12 credits outside the major in consultation with the advisor.

<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
<td>AFRO 8202</td>
<td>Seminar: Intellectual History of Race (3.0 cr)</td>
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<tr>
<td>AMST 8920</td>
<td>Topics in American Studies (3.0 cr)</td>
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<tr>
<td>ANTH 8203</td>
<td>Research Methods in Social and Cultural Anthropology (3.0 cr)</td>
</tr>
<tr>
<td>DSSC 8112</td>
<td>Scholarship and Public Responsibility (1.0 cr)</td>
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<tr>
<td>DSSC 8211</td>
<td>Doctoral Research Workshop in Development Studies and Social Change (3.0 cr)</td>
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<tr>
<td>EPSY 8268</td>
<td>Hierarchical Linear Modeling in Educational Research (3.0 cr)</td>
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<tr>
<td>EPSY 8282</td>
<td>Statistical Analysis of Longitudinal Data (3.0 cr)</td>
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<tr>
<td>GEOG 8230</td>
<td>Theoretical Geography (3.0 cr)</td>
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<tr>
<td>GEOG 8292</td>
<td>Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)</td>
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<tr>
<td>GEOG 8294</td>
<td>Spatiotemporal Modeling and Simulation (3.0 cr)</td>
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<tr>
<td>GEOG 8970</td>
<td>Directed Readings (1.0 - 5.0 cr)</td>
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<tr>
<td>GEOG 8980</td>
<td>Topics: Geography (1.0 - 3.0 cr)</td>
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<tr>
<td>GLOS 5403</td>
<td>Human Rights Advocacy (3.0 cr)</td>
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<td>GLOS 5900</td>
<td>Topics in Global Studies (1.0 - 4.0 cr)</td>
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<tr>
<td>GRAD 8401</td>
<td>Dissertation Proposal Development Seminar (3.0 cr)</td>
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<tr>
<td>GWSS 5104</td>
<td>Transnational Feminist Theory (3.0 cr)</td>
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<td>GWSS 8108</td>
<td>Genealogies of Feminist Theory (3.0 cr)</td>
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<tr>
<td>GWSS 8109</td>
<td>Feminist Knowledge Production (3.0 cr)</td>
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<tr>
<td>GWSS 8250</td>
<td>Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)</td>
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<tr>
<td>GWSS 8260</td>
<td>Seminar: Race, Representation and Resistance (3.0 cr)</td>
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<tr>
<td>GWSS 8270</td>
<td>Seminar: Theories of Body (3.0 cr)</td>
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<tr>
<td>GWSS 8995</td>
<td>Directed Research (1.0 - 8.0 cr)</td>
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<tr>
<td>HIST 5890</td>
<td>Readings in American Indian and Indigenous History (3.0 cr)</td>
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<td>HIST 5902</td>
<td>Latin America Proseminar: Modern (3.0 cr)</td>
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<td>HIST 5910</td>
<td>Topics in U.S. History (1.0 - 4.0 cr)</td>
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<td>HIST 8900</td>
<td>Topics in European/Medieval History (1.0 - 4.0 cr)</td>
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<tr>
<td>HIST 8910</td>
<td>Topics in U.S. History (1.0 - 4.0 cr)</td>
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<tr>
<td>HIST 8920</td>
<td>Topics in African History (1.0 - 4.0 cr)</td>
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<td>HIST 8960</td>
<td>Topics in History (1.0 - 4.0 cr)</td>
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<tr>
<td>HIST 8970</td>
<td>Advanced Research in Quantitative History (3.0 cr)</td>
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<td>HIST 8993</td>
<td>Directed Study (1.0 - 16.0 cr)</td>
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<tr>
<td>JOUR 8503</td>
<td>Advanced Qualitative Methods in Mass Communication Research (3.0 cr)</td>
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<tr>
<td>KIN 5126</td>
<td>Social Psychology of Sport &amp; Physical Activity (3.0 cr)</td>
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<tr>
<td>LAW 6846</td>
<td>Philosophy of Punishment (3.0 cr)</td>
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<tr>
<td>LAW 6889</td>
<td>Laws of War (3.0 cr)</td>
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<tr>
<td>LING 5900</td>
<td>Topics in Linguistics (3.0 cr)</td>
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<tr>
<td>OLPD 5103</td>
<td>Comparative Education (3.0 cr)</td>
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<tr>
<td>OLPD 8095</td>
<td>Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)</td>
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<tr>
<td>PA 5151</td>
<td>Organizational Perspectives on Global Development &amp; Humanitarian Assistance (3.0 cr)</td>
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<tr>
<td>PA 5281</td>
<td>Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)</td>
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<tr>
<td>PA 5301</td>
<td>Population Methods &amp; Issues for the United States &amp; Global South (3.0 cr)</td>
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<tr>
<td>PA 5401</td>
<td>Poverty, Inequality, and Public Policy (3.0 cr)</td>
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<tr>
<td>PA 5451</td>
<td>(Inactive)</td>
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<tr>
<td>PA 5490</td>
<td>Topics in Social Policy (1.0 - 4.0 cr)</td>
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<tr>
<td>PA 5801</td>
<td>Global Public Policy (3.0 cr)</td>
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<tr>
<td>PA 5823</td>
<td>Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)</td>
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<tr>
<td>PA 8151</td>
<td>Organizational Perspectives on Global Development &amp; Humanitarian Assistance (3.0 cr)</td>
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<tr>
<td>PA 8312</td>
<td>Analysis of Discrimination (4.0 cr)</td>
</tr>
<tr>
<td>PA 8331</td>
<td>Economic Demography (3.0 cr)</td>
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<tr>
<td>PA 8390</td>
<td>Advanced Topics in Advanced Policy Analysis Methods (1.0 - 3.0 cr)</td>
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</table>
PA 8461 - Global and U.S. Perspectives on Health and Mortality (3.0 cr)
PA 8690 - Advanced Topics in Women, Gender and Public Policy (1.0 - 3.0 cr)
PHIL 8310 - Seminar: Moral Philosophy (3.0 cr)
POL 8160 - Topics in Models and Methods (3.0 cr)
POL 8260 - Topics in Political Theory (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)
PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
PSY 8205 - Principles of Social Psychology (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PUBH 6000 - Topics: Community Health Promotion (0.5 - 4.0 cr)
PUBH 6370 - Social Epidemiology (2.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits.

SOC 8888 - Thesis Credits: Doctoral (1.0 - 24.0 cr)
**Twin Cities Campus**

**Speech-Language-Hearing Science M.A.**

**Speech-Language-Hearing Sciences**

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**

Department of Speech-Language-Hearing-Sciences, 115 Shevlin Hall, 164 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)

Email: slhsgrad@umn.edu

Website: [http://www.slhs.umn.edu](http://www.slhs.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 36 to 60
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Speech-Language-Hearing Sciences offers an MA with three tracks: speech-language pathology, audiology, and speech-language-hearing sciences; however, the department only accepts MA applications for the speech-language pathology track. The speech-language pathology track focuses on meeting standards for certification as a speech-language pathologist by the American Speech-Language-Hearing Association. It emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques and technology, counseling approaches, and human development.

Individuals interested in pursuing an advanced degree in audiology should apply directly to the audiology AuD program. Students admitted to the AuD are eligible to apply for the MA with an audiology track.

The Master of Arts (MA) education program in speech-language pathology at the University of Minnesota Twin Cities is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2200 Research Boulevard #310, Rockville, Maryland 20850, 800-498-2071 or 301-296-5700.

**Accreditation**

This program is accredited by Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA).

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 2.80.

**Special Application Requirements:**

Applicants are expected to have completed coursework in statistics (including hypothesis testing), social/behavioral sciences, biological sciences, and physical sciences (physics or chemistry) as well as the following prerequisite courses:

- SLHS 3302: Anatomy & Physiology of the Speech & Hearing Mechanisms
- SLHS 3303: Language Acquisition & Science
- SLHS 3304: Phonetics
- SLHS 3305W: Speech Science
- SLHS 4301: Introduction to the Neuroscience of Human Communication
- SLHS 4402: Assessment and Treatment in Speech-Language Pathology
- SLHS 4801: Clinical Methods in Assessing Auditory Functions and Disorders
- SLHS 4802: Rehabilitative Audiology

Students admitted without having completed the above prerequisites must complete them upon admission. Prerequisite courses do not count toward the minimum SLP course requirements outlined below, and students admitted without the coursework can expect an
additional, 3rd year to complete the MA.

All offers of SLP admission are contingent upon the results of a criminal background check administered by the Minnesota Department of Human Services and completion of immunization requirements.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 45 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 30 to 54 major credits and 6 credits outside the major. The final exam is written and oral.

**Plan C:** Plan C requires 49 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

**Plan B and Plan C Only** - Select 6 Outside Coursework credits in consultation with the advisor. Other courses can be selected with adviser approval.

Plan C students must pass a written exam.

**Outside Coursework (6 credits)**

Take 6 or more credit(s) from the following:

- ABUS 4022W - Management in Organizations [WI] (3.0 cr)
- ABUS 4023W - Communicating for Results [WI] (3.0 cr)
- ABUS 4041 - Dynamics of Leadership (3.0 cr)
- ABUS 4014 - Management and Human Resource Practices (3.0 cr)
- ABUS 4701 - Introduction to Marketing (3.0 cr)
- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- BTHX 5000 - Topics in Bioethics (1.0 - 4.0 cr)
- BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
- BTHX 5325 - Biomedical Ethics (3.0 cr)
- CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5642 - Assessing English Learners (3.0 cr)
- CI 5653 - Methods in Teaching English as a Second Language (ESL) in Higher Education (3.0 cr)
- CPSY 4302 - Infant Development (3.0 cr)
- CPSY 4329 - Biological Foundations of Development (3.0 cr)
- CPSY 4341 - Perceptual Development (3.0 cr)
- CPSY 4343 - Cognitive Development (3.0 cr)
- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
• CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5400 - Special Topics in Counseling Psychology (1.0 - 4.0 cr)
• EPSY 5415 - Counseling Children and Adolescents (3.0 cr)
• EPSY 5461 - Cross-Cultural Counseling (3.0 cr)
• EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
• EPSY 5616W - Classroom Management and Behavior Analytic Problem Solving [WI] (3.0 cr)
• EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
• EPSY 5641 - Foundations of Deaf Education (3.0 cr)
• EPSY 5642 - Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing (3.0 cr)
• EPSY 5643 - Seminar: Identity, Culture and Diversity in Deaf Education (2.0 cr)
• EPSY 5644 - Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing (3.0 cr)
• EPSY 5645 - Deaf Plus: Educating and Understanding Deaf Students with Disabilities (2.0 cr)
• EPSY 5654 - Current Research, Issues Trends in Deaf Education (1.0 cr)
• EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
• EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
• EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorder (3.0 cr)
• EPSY 5681 - Educating Preschoolers with Disabilities: Specialized Approaches and Interventions (3.0 cr)
• EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
• EPSY 5900 - Special Topics: Special Education Issues (1.0 - 3.0 cr)
• EPSY 5902 - Advanced Topics in Special Education Research (3.0 cr)
• FSOS 4107 - Traumatic Stress and Resilience in Vulnerable Families Across the Lifespan (3.0 cr)
• FSOS 5937 - Parent-Child Interaction (3.0 cr)
• FSOS 5942 - Diverse Family Experiences (3.0 cr)
• FSOS 5101 - Family Stress, Coping, and Adaptation (3.0 cr)
• GCC 5122 - The Human Experience of Sensory Loss: Seeking Equitable and Effective Solutions [TS] (3.0 cr)
• GERD 5125 - Gerontology Service Learning (1.0 - 3.0 cr)
• HINF 5501 - US Health Care System: Information Challenges in Clinical Care (1.0 cr)
• HSM 4065 - Information Privacy and Security in Health Services Management [TS] (3.0 cr)
• HSM 4531 - Human Resources in Health Care Settings (3.0 cr)
• KIN 8211 - Seminar: Perception and Action (3.0 cr)
• LING 8921 - Seminar in Language and Cognition (3.0 cr)
• NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
• NSCI 5111 - Medical Neuroscience for Graduate Students (5.0 cr)
• OLPD 5211 - Introduction to the Undereducated Adult (1.0 cr)
• OLPD 5212 - Disability Policy and Services (3.0 cr)
• OTOL 8234 - Anatomy of the Head and Neck and Temporal Bone Dissection (2.0 cr)
• OTOL 8247 - Anatomy and Physiology of Hearing and Balance (3.0 cr)
• PA 5451 - [inactive] (3.0 cr)
• PHAR 5201 - Applied Medical Terminology (2.0 cr)
• PSY 4036 - Perceptual Issues in Visual Impairment (3.0 cr)
• PSY 4960 - Seminar in Psychology (1.0 - 4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5037 - Psychology of Hearing (3.0 cr)
• PSY 5054 - Psychology of Language (3.0 cr)
• PSY 5062 - Cognitive Neuropsychology (3.0 cr)
• PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
• PSY 8037 - Psychophysics and Audition (3.0 cr)
• PUBH 6055 - Social Inequalities in Health (2.0 cr)
• PUBH 6102 - Issues in Environmental Health (2.0 cr)
• PUBH 6370 - Social Epidemiology (2.0 cr)
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
• SLHS 5502 - Voice and Cleft Palate (3.0 cr)
• SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
• SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
• SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
• SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
• SLHS 5609 - Child Language Disorders in Diverse Populations (3.0 cr)
• SLHS 5804 - Cochlear Implants (3.0 cr)
• SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
• SLHS 5900 - Topics in SLHS (2.0 cr)
Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Speech-Language Pathology
This sub-plan is limited to students completing the program under Plan A or Plan C.

Students pursuing this sub-plan complete the 55-credit Plan A or 55-credit Plan C option.

Required Courses (27 credits)
Take the following courses: Courses must be taken A-F.
• SLHS 5401 - Counseling and Professional Issues (3.0 cr)
• SLHS 5502 - Voice and Cleft Palate (3.0 cr)
• SLHS 5503 - Stuttering Motor Speech Disorders (3.0 cr)
• SLHS 5504 - Evaluation and Management of Dysphagia (3.0 cr)
• SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
• SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
• SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
• SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
• SLHS 5609 - Child Language Disorders in Diverse Populations (3.0 cr)

Clinical Education in Speech-Language Pathology (17 credits)
Take exactly 17 credit(s) from the following:
• SLHS 8720 - Clinical Education in Speech-Language Pathology (1.0 - 8.0 cr)

Clinical Education in Audiology (1 credit)
Take exactly 1 credit(s) from the following:
• SLHS 8820 - Clinical Education in Audiology (1.0 - 8.0 cr)

Plan Options

Plan A
Take 10 Master's Thesis credits.
Take exactly 10 credit(s) from the following:
• SLHS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

OR

Plan C
Take 4 credits in consultation with the advisor on the S/N grade basis.
Take exactly 4 credit(s) from the following:
• SLHS 8994 - Directed Research (1.0 - 12.0 cr)

Audiology
This sub-plan is limited to students completing the program under Plan B.

Students pursuing this sub-plan complete a 60-credit Plan B option.

Required Courses (42 credits)
Take the following courses, courses must be taken A-F:
• SLHS 5401 - Counseling and Professional Issues (3.0 cr)
• SLHS 5801 - Advanced Audiologic Assessment (3.0 cr)
• SLHS 5802 - Hearing Aids I (3.0 cr)
• SLHS 5803 - Pediatric Audiology (3.0 cr)
• SLHS 5804 - Cochlear Implants (3.0 cr)
• SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
SLHS 5806 - Auditory Disorders in Children (3.0 cr)
SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
SLHS 5808 - Pathophysiology of Hearing Disorders (3.0 cr)
SLHS 8801 - Electrophysiologic Assessment of Auditory Function (3.0 cr)
SLHS 8802 - Hearing Aids II (3.0 cr)
SLHS 8803 - Signals and Systems in Audiology (3.0 cr)
SLHS 8805 - Hearing Science Foundations of Audiology (3.0 cr)
SLHS 8807 - Balance Assessment (3.0 cr)

**Laboratory Module in Audiology (2 credits)**
Take 2 credits of the following:
- SLHS 5810 - Laboratory Module in Audiology (1.0 - 2.0 cr)

**Clinical Research and Practice: Grand Rounds (4 credits)**
Take 4 credits of the following:
- SLHS 5820 - Clinical Research and Practice: Grand Rounds (1.0 - 6.0 cr)

**Clinical Foundations in Audiology (2 credits)**
Take 2 credits of the following:
- SLHS 5830 - Clinical Foundations in Audiology (1.0 - 8.0 cr)

**Directed Research (4 credits)**
Take 4 credits in consultation with the advisor on the S/N grade basis.
- SLHS 8994 - Directed Research (1.0 - 12.0 cr)

**Speech-Language-Hearing Sciences (SLHS)**
This sub-plan is limited to students completing the program under Plan B.

Students pursuing this sub-plan complete the 36-credit Plan B option.

**Required Courses**
Take 30 major credits (including 4 credits of SLHS 8994) and 6 credits of outside coursework.

Take 4 credits in consultation with the advisor on the S/N grade basis: SLHS 8994 - Directed Research (1.0-12.0)
Twin Cities Campus
Speech-Language-Hearing Sciences Minor
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhsgrad@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphasis in the graduate program is speech-language pathology and audiology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Speech-Language-Hearing Sciences director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The approval of the SLHS director of graduate studies is required prior to registration for any 4xxx-level minor field coursework.

The minimum cumulative GPA for minor field coursework is 3.00.

Coursework (9 to 12 credits)
Master's students select 9 credits and doctoral students select 12 credits from the following in consultation with the Speech-Language-Hearing Sciences director of graduate studies:

- SLHS 4301 - Introduction to the Neuroscience of Human Communication (3.0 cr)
- SLHS 4402 - Clinical Methods in Speech-Language Pathology (3.0 cr)
- SLHS 4801 - Clinical methods in assessing auditory function and disorders (3.0 cr)
- SLHS 4802 - Clinical Methods for Treating Hearing Disorders (3.0 cr)
- SLHS 5502 - Voice and Cleft Palate (3.0 cr)
- SLHS 5503 - Stuttering Motor Speech Disorders (3.0 cr)
- SLHS 5504 - Evaluation and Management of Dysphagia (3.0 cr)
- SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
- SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
- SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
- SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
- SLHS 5609 - Child Language Disorders in Diverse Populations (3.0 cr)
- SLHS 5801 - Advanced Audiologic Assessment (3.0 cr)
- SLHS 5802 - Hearing Aids I (3.0 cr)
SLHS 5803 - Pediatric Audiology (3.0 cr)
SLHS 5804 - Cochlear Implants (3.0 cr)
SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
SLHS 5806 - Auditory Disorders in Children (3.0 cr)
SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
SLHS 5808 - Pathophysiology of Hearing Disorders (3.0 cr)
SLHS 5810 - Laboratory Module in Audiology (1.0 - 2.0 cr)
SLHS 5900 - Topics in SLHS (2.0 cr)
SLHS 5993 - Directed Study (1.0 - 12.0 cr)
SLHS 8111 - Directed Readings in Speech-Language-Hearing Sciences (1.0 - 3.0 cr)
SLHS 8410 - Seminar: Research (3.0 cr)
SLHS 8420 - Seminar: Teaching (3.0 cr)
SLHS 8530 - Seminar: Speech (3.0 cr)
SLHS 8801 - Electrophysiologic Assessment of Auditory Function (3.0 cr)
SLHS 8802 - Hearing Aids II (3.0 cr)
SLHS 8803 - Signals and Systems in Audiology (3.0 cr)
SLHS 8805 - Hearing Science Foundations of Audiology (3.0 cr)
SLHS 8807 - Balance Assessment (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Speech-Language-Hearing Sciences Ph.D.
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhsgrad@umn.edu
Website: http://www.slhs.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 65
• This program requires summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases in the PhD program are speech-language pathology, audiology, speech science, language science, or hearing science. The program prepares students for careers in research, teaching, and advanced clinical applications. Most students entering the program have a master's degree in speech-language pathology, audiology, or a related area. The PhD degree usually requires five or more years of work beyond the master's degree. In general, a student's program is designed by the student in consultation with the advisor to satisfy the particular objectives of the student and program requirements.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
29 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.
At least 1 semesters must be completed before filing a Degree Program Form.

**Required Coursework (29 credits)**

**Seminars (6 credits)**
- Take the following course:
  - SLHS 8410 - Seminar: Research (3.0 cr)
- Select 1 of the following courses in consultation with the advisor:
  - SLHS 8420 - Seminar: Teaching (3.0 cr)
  - or GRAD 8101 - Teaching in Higher Education (3.0 cr)

**Proseminars (6 credits)**
- Take 6 credits of the following:
  - SLHS 8430 - Proseminar in Speech-Language-Hearing Sciences (1.0 - 6.0 cr)

**Research Experience (4 credits)**
- Take 4 credits of the following:
  - SLHS 8112 - Supervised Laboratory Experience (1.0 - 2.0 cr)

**Teaching Experience (4 credits)**
- Take 4 credits from the following:
  - SLHS 8113 - Supervised Teaching Experience (1.0 - 2.0 cr)

**Statistics (6 credits)**
- Select 6 credits from the following in consultation with the advisor:
  - EPSY 5261 - Introductory Statistical Methods (3.0 cr)
  - EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
  - EPSY 8251 - Statistical Methods in Education I (3.0 cr)
  - EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Statistics Electives (3 credits)**
- Select 3 credits from the following in consultation with the advisor:
  - EPSY 8220 - Special Topics: Seminar in Quantitative Methods (1.0 - 6.0 cr)
  - EPSY 8222 - Advanced Measurement: Theory and Application (3.0 cr)
  - EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
  - EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
  - EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
  - EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
  - EPSY 8265 - Factor Analysis (3.0 cr)
  - EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
  - EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
  - EPSY 8269 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
  - EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
  - STAT 4101 - Theory of Statistics I (4.0 cr)
  - STAT 4102 - Theory of Statistics II (4.0 cr)
  - STAT 4893W - Consultation and Communication for Statisticians [WI] (3.0 cr)
  - STAT 5021 - Statistical Analysis (4.0 cr)
  - STAT 5101 - Theory of Statistics I (4.0 cr)
  - STAT 5102 - Theory of Statistics II (4.0 cr)
  - STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
  - STAT 5302 - Applied Regression Analysis (4.0 cr)
  - STAT 5303 - Designing Experiments (4.0 cr)
  - STAT 5401 - Applied Multivariate Methods (3.0 cr)
  - STAT 5421 - Analysis of Categorical Data (3.0 cr)
  - STAT 5501 - Nonparametric Methods (3.0 cr)
  - STAT 5701 - Statistical Computing (3.0 cr)
  - STAT 5931 - Topics in Statistics (3.0 cr)
  - STAT 5993 - Tutorial (1.0 - 6.0 cr)
  - STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
  - STAT 8052 - Advanced Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
  - STAT 8053 - Advanced Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
  - STAT 8054 - Advanced Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
  - STAT 8102 - Theory of Statistics 2 (3.0 cr)
  - STAT 8111 - Mathematical Statistics I (3.0 cr)
  - STAT 8112 - Mathematical Statistics II (3.0 cr)
  - STAT 8311 - Linear Models (3.0 cr)
  - STAT 8801 - Statistical Consulting (3.0 cr)
  - STAT 8913 - Literature Seminar (1.0 cr)
  - STAT 8931 - Advanced Topics in Statistics (3.0 cr)
  - STAT 8932 - Advanced Topics in Statistics (3.0 cr)
### Outside Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ADDS 5021</td>
<td>Introduction to Evidence Based Practices and the Helping Relationship</td>
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<tr>
<td>BMEN 5101</td>
<td>Advanced Bioelectricity and Instrumentation</td>
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<td>BMEN 5411</td>
<td>Neural Engineering</td>
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<td>BMEN 5412</td>
<td>Neuromodulation</td>
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<td>Biomedical Digital Signal Processing</td>
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<td>BMEN 8502</td>
<td>Physiological Control Systems</td>
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<td>BTHX 5000</td>
<td>Topics in Bioethics</td>
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<td>BTHX 5100</td>
<td>Introduction to Clinical Ethics</td>
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<td>Perspectives in Learning, Perception, and Cognition</td>
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<td>CI 5451</td>
<td>Teaching Reading in Middle and Secondary Grades</td>
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<tr>
<td>CI 5642</td>
<td>Assessing English Learners</td>
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<td>CI 5653</td>
<td>Methods in Teaching English as a Second Language (ESL) in Higher Education</td>
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<td>CPSY 4302</td>
<td>Infant Development</td>
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<td>CPSY 4329</td>
<td>Biological Foundations of Development</td>
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<td>CPSY 4341</td>
<td>Perceptual Development</td>
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<td>CPSY 4343</td>
<td>Cognitive Development</td>
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<tr>
<td>CSPH 5101</td>
<td>Introduction to Integrative Healing Practices</td>
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<td>CSPH 5111</td>
<td>Ways of Thinking about Health</td>
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<td>CSPH 5708</td>
<td>Mind-Body Science and the Art of Transformation</td>
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<td>CSPH 5806</td>
<td>Wellbeing and Resiliency for Health Professionals</td>
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<td>CSPH 5807</td>
<td>Mindfulness in the Workplace: Pause, Practice, Perform</td>
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<td>EPSY 5101</td>
<td>Intelligence and Creativity</td>
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<td>EPSY 5135</td>
<td>Human Relations Workshop</td>
<td>4.0 cr</td>
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<tr>
<td>EPSY 5400</td>
<td>Special Topics in Counseling Psychology</td>
<td>(1.0 - 4.0 cr)</td>
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<tr>
<td>EPSY 5415</td>
<td>Counseling Children and Adolescents</td>
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<td>EPSY 5461</td>
<td>Cross-Cultural Counseling</td>
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<td>EPSY 5609</td>
<td>Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention</td>
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<tr>
<td>EPSY 5616W</td>
<td>Classroom Management and Behavior Analytic Problem Solving [WI]</td>
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<td>EPSY 5625</td>
<td>Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction</td>
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<tr>
<td>EPSY 5641</td>
<td>Foundations of Deaf Education</td>
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<tr>
<td>EPSY 5642</td>
<td>Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing</td>
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<tr>
<td>EPSY 5644</td>
<td>Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing</td>
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<tr>
<td>EPSY 5657</td>
<td>Interventions for Behavioral Problems in School Settings</td>
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<td>EPSY 5661</td>
<td>Introduction to Autism Spectrum Disorder</td>
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<tr>
<td>EPSY 5653</td>
<td>Assessment and Intervention for Individuals with Autism Spectrum Disorder</td>
<td>3.0 cr</td>
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<tr>
<td>EPSY 5681</td>
<td>Educating Preschoolers with Disabilities: Specialized Approaches and Interventions</td>
<td>3.0 cr</td>
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<tr>
<td>EPSY 8600</td>
<td>Special Topics: Special Education Issues</td>
<td>(1.0 - 3.0 cr)</td>
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<td>FSOS 5937</td>
<td>Parent-Child Interaction</td>
<td>3.0 cr</td>
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<td>FSOS 5942</td>
<td>Diverse Family Experiences</td>
<td>3.0 cr</td>
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<tr>
<td>FSOS 8101</td>
<td>Family Stress, Coping, and Adaptation</td>
<td>3.0 cr</td>
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<td>GERO 5125</td>
<td>Gerontology Service Learning</td>
<td>(1.0 - 3.0 cr)</td>
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<tr>
<td>HINF 5501</td>
<td>US Health Care System: Information Challenges in Clinical Care</td>
<td>1.0 cr</td>
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<td>KIN 8211</td>
<td>Seminar: Perception and Action</td>
<td>3.0 cr</td>
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<td>LING 8921</td>
<td>Seminar in Language and Cognition</td>
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<td>NSC 5561</td>
<td>Systems Neuroscience</td>
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<td>NSCI 5101</td>
<td>Neurobiology I: Molecules, Cells, and Systems</td>
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<td>NSCI 5111</td>
<td>Medical Neuroscience for Graduate Students</td>
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<td>OLPD 5211</td>
<td>Introduction to the Undereducated Adult</td>
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<td>OLPD 5356</td>
<td>Disability Policy and Services</td>
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<td>OTOL 8234</td>
<td>Anatomy of the Head and Neck and Temporal Bone Dissection</td>
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<td>OTOL 8247</td>
<td>Anatomy and Physiology of Hearing and Balance</td>
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<td>PHAR 5201</td>
<td>Applied Medical Terminology</td>
<td>2.0 cr</td>
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<tr>
<td>PSY 4036</td>
<td>Perceptual Issues in Visual Impairment</td>
<td>3.0 cr</td>
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<td>PSY 4960</td>
<td>Seminar in Psychology</td>
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<td>PSY 5014</td>
<td>Psychology of Human Learning and Memory</td>
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<td>PSY 5054</td>
<td>Psychology of Language</td>
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<td>PSY 5062</td>
<td>Cognitive Neuropsychology</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 5137</td>
<td>Introduction to Behavioral Genetics</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 5205</td>
<td>Applied Social Psychology</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 5960</td>
<td>Topics in Psychology</td>
<td>(1.0 - 4.0 cr)</td>
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<tr>
<td>PSY 8037</td>
<td>Psychophysics and Audition</td>
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<td>PUBH 6370</td>
<td>Social Epidemiology</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6751</td>
<td>Principles of Management in Health Services Organizations</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6904</td>
<td>Nutrition and Aging</td>
<td>2.0 cr</td>
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</table>
PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
SLHS 5900 - Topics in SLHS (2.0 cr)
SLHS 8530 - Seminar: Speech (3.0 cr)
SOC 4246 - Sociology of Health and Illness (3.0 cr)
SLHS 8111 - Directed Readings in Speech-Language-Hearing Sciences (1.0 - 3.0 cr)
SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits.

SLHS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Joint- or Dual-degree Coursework:**
AuD and PhD in Speech-Language-Hearing Sciences
Student may take a total of 9 credits in common among the academic programs.
Twin Cities Campus
Statistics M.S.
Statistics, School of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Statistics, 313 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.stat.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A maximum of 6.0 S/N credits can be applied to degree requirements.
Required Coursework

Core Courses (18 credits)
Take the following courses:
- STAT 5701 - Statistical Computing (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed Effects Modeling (3.0 cr)
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
- STAT 8102 - Theory of Statistics 2 (3.0 cr)
- STAT 8801 - Statistical Consulting (3.0 cr)

Statistics Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be selected with advisor approval.
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5511 - Time Series Analysis (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- STAT 8111 - Mathematical Statistics I (3.0 cr)
- STAT 8112 - Mathematical Statistics II (3.0 cr)
- STAT 8931 - Advanced Topics in Statistics (3.0 cr)
- STAT 8932 - Advanced Topics in Statistics (3.0 cr)

Outside Coursework (6 credits)
Select 6 credits outside the major in consultation with the advisor. Other courses may be selected with advisor approval.
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- IE 8521 - Optimization (4.0 cr)
- MATH 5075 - Mathematics of Options, Futures, and Derivative Securities I (4.0 cr)
- MATH 5076 - Mathematics of Options, Futures, and Derivative Securities II (4.0 cr)
- MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
- POL 8124 - Game Theory (3.0 cr)
- POL 8125 - Dynamic Analysis (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
Twin Cities Campus

Statistics Minor
Statistics, School of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Statistics, 313 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 ( 612-625-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: https://cla.umn.edu/statistics/undergraduate/majors-minors/undergraduate-minor-statistics

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 14
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Statistics director of graduate studies regarding feasibility and requirements.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each, unless otherwise approved by the Statistics director of graduate studies.

Doctoral students cannot apply 4-level courses or STAT 5021 to the minor.

The minimum cumulative GPA for minor field coursework is 2.80.

Coursework (9 to 14 credits)
Masters students select 9 credits, and doctoral students select 14 credits from the following in consultation with their advisor and the Statistics director of graduate studies.
STAT 4051 - Applied Statistics I (4.0 cr)
STAT 4052 - Introduction to Statistical Learning (4.0 cr)
### STAT 4101 - Theory of Statistics I (4.0 cr)
### STAT 4102 - Theory of Statistics II (4.0 cr)
### STAT 5021 - Statistical Analysis (4.0 cr)
### STAT 5101 - Theory of Statistics I (4.0 cr)
### STAT 5102 - Theory of Statistics II (4.0 cr)
### STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
### STAT 5302 - Applied Regression Analysis (4.0 cr)
### STAT 5303 - Designing Experiments (4.0 cr)
### STAT 5401 - Applied Multivariate Methods (3.0 cr)
### STAT 5421 - Analysis of Categorical Data (3.0 cr)
### STAT 5511 - Time Series Analysis (3.0 cr)
### STAT 5601 - Nonparametric Methods (3.0 cr)
### STAT 5701 - Statistical Computing (3.0 cr)
### STAT 5931 - Topics in Statistics (3.0 cr)
### STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
### STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
### STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
### STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
### STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
### STAT 8101 - Theory of Statistics 1 (3.0 cr)
### STAT 8102 - Theory of Statistics 2 (3.0 cr)
### STAT 8111 - Mathematical Statistics I (3.0 cr)
### STAT 8112 - Mathematical Statistics II (3.0 cr)
### STAT 8301 - Linear Models (3.0 cr)
### STAT 8312 - Linear and Nonlinear Regression (3.0 cr)
### STAT 8321 - Regression Graphics (3.0 cr)
### STAT 8401 - Topics in Multivariate Methods (3.0 cr)
### STAT 8411 - Multivariate Analysis (3.0 cr)
### STAT 8421 - Theory of Categorical Data Analysis (3.0 cr)
### STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)
### STAT 8511 - Time Series Analysis (3.0 cr)
### STAT 8931 - Advanced Topics in Statistics (3.0 cr)
### STAT 8932 - Advanced Topics in Statistics (3.0 cr)

## Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

- **Masters**
- **Doctoral**
Twin Cities Campus
Statistics Ph.D.
Statistics, School of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Statistics, 313 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-625-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.stat.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 73
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of theoretical, computational, and applied statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
40 credits are required in the major.
9 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

A maximum of 6.0 units of S/N graded courses can apply to these requirements.
Core Courses (28 credits)
Take the following courses. Take STAT 8913 for a total of 4 credits.

- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- STAT 8111 - Mathematical Statistics I (3.0 cr)
- STAT 8112 - Mathematical Statistics II (3.0 cr)
- STAT 8311 - Linear Models (3.0 cr)
- STAT 8801 - Statistical Consulting (3.0 cr)
- STAT 8913 - Literature Seminar (1.0 cr)

Electives (12 credits)
Select 12 credits from the following in consultation with the advisor. Other coursework can be applied to this requirement with approval of the advisor and director of graduate studies.

- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
- STAT 8057 - Time Series Analysis (3.0 cr)
- STAT 8931 - Advanced Topics in Statistics (3.0 cr)
- STAT 8932 - Advanced Topics in Statistics (3.0 cr)

Outside Coursework (9 credits)

Required Math Courses (6 credits)
Take the following courses. Comparable courses can be substituted with approval of the advisor and director of graduate studies.

- MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
- MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)

Additional Courses (3 credits)
Select 3 credits in consultation with the advisor and director of graduate studies to complete the 9-credit minimum.

- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- IE 8521 - Optimization (4.0 cr)
- MATH 5075 - Mathematics of Options, Futures, and Derivative Securities I (4.0 cr)
- MATH 5076 - Mathematics of Options, Futures, and Derivative Securities II (4.0 cr)
- MATH 8659 - Stochastic Processes (3.0 cr)
- POL 8124 - Game Theory (3.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.

- STAT 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Strategic Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Hubbard School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-625-1338; fax: 612-626-8251)
Email: sjmcgrad@umn.edu
Website: https://hsjmc.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Strategic Communication MA is designed to serve working communications professionals in advertising, public relations, corporate communications, nonprofit organizations, and government. The 30-credit program, which can be completed in 24 calendar months, is conceptually and structurally distinct from the academic master's degree in mass communication in that it focuses on advanced professional study of communications strategy, media, planning, evaluation, and creative management. The MA in strategic communication curriculum is tailored to provide the best foundation for future communications leaders, recognizing that the communication industry is changing rapidly. With digital communication continuing to transform the industry, and massive organizational and global forces reshaping the U.S. economy, communications leaders face significant challenges and can prepare themselves through in-depth study of strategic process management.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
A baccalaureate degree from an accredited U.S. institution or its foreign equivalent is required.

Other requirements to be completed before admission:
- Graduate School accepted ELP exams

Special Application Requirements:
In addition to the baccalaureate degree, professionals in strategic communication -- currently employed in advertising, public relations, or marketing firms, or in a communications or related function within a corporation or nonprofit organization -- should have at least two years of professional experience. This professional experience can be in any of the following areas: account planning, account management, advertising management, media planning or buying, media sales, promotion marketing, corporate communications, public affairs, public relations, investor relations, direct marketing, sales management, marketing management, brand management, broadcast or print journalism, market research, content creation, or event management.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Plan C: Plan C requires 27 to 30 major credits and 0 to 3 credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The project requires completion of the capstone course (JOUR 8206), in consultation with the advisor and academic director, that supports completion of the student's strategic communication campaign project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

All coursework must be taken on the A-F grading basis.

Required Courses (21 credits)
Take the following courses:
- JOUR 5251 - Strategic Communication Theory (3.0 cr)
- JOUR 8200 - Strategic Communication Research Methods (3.0 cr)
- JOUR 8201 - Factors Affecting Communication Strategy (3.0 cr)
- JOUR 8202 - Generation and Selection of Communication Strategies (3.0 cr)
- JOUR 8203 - Integration of Communication Strategies Across Media (3.0 cr)
- JOUR 8205 - Strategic Communication Cases & Campaigns (3.0 cr)
- JOUR 8208 - Digital Strategy, Planning and Analytics (3.0 cr)

Journalism Electives (3-6 credits)
Select 3 to 6 credits from the following in consultation with the advisor and/or academic director.
- JOUR 5252 - Issue Management Communication and Brand Advocacy (3.0 cr)
- JOUR 5253 - Content Strategy and Development (3.0 cr)
- JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
- JOUR 5541 - Mass Communication and Public Health (3.0 cr)
- JOUR 8290 - Special Topics in Strategic Communication (3.0 cr)

Outside Coursework (0-3 credits)
Select 0 to 3 credits from the following in consultation with the advisor and/or academic director.
- COMM 5441 - Communication in Human Organizations (3.0 cr)
- ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 5671 - Visual Rhetoric (3.0 cr)

Individual Project (3 credits)
Complete the following with a minimum grade of B:
- JOUR 8206 - Directed Study: Development of an Integrated Strategic Communication Campaign (3.0 cr)
Twin Cities Campus

Studies in Africa and African Diaspora Minor
African-American & African Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of African American and African Studies, 810 Social Sciences Building, 267 19th Ave S, Minneapolis, MN 55455 (612-624-9847; fax: 612-624-8383)
Email: www.aaas.umn.edu
Website: http://www.aaas.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary graduate minor is administered through the Department of African American & African Studies. The minor program gives students from a variety of disciplines a structured graduate curriculum that offers a systematic understanding of the contemporary and historical experiences of peoples of Africa and of the African diaspora. It is organized around a group of core seminars and focuses on two broad areas: the humanities and the arts, and the social and behavioral sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
An undergraduate major or minor in African American and/or African studies is not required for admission to the minor, but students are expected to have had sufficient background to begin graduate-level study.

Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Studies in Africa and African Diaspora director of graduate studies regarding feasibility and requirements.

Students must complete an application form by the end of spring semester to be considered for acceptance for the following academic year.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students develop the minor in consultation with the Studies in Africa and the African Diaspora director of graduate studies and with their graduate program.

All courses must be outside the student's major field of study.

Minor field coursework offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for minor field coursework is 3.00.
Required Course (3 credits)
Take the following course:
AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)

Electives (6 to 9 credits)
Masters students select 6 credits, and doctoral students select 9 credits from the following, with the approval of the Studies in Africa and African Diaspora director of graduate studies. Selected courses will focus on the arts and humanities or behavioral and social sciences.
AFRO 5xxx
AFRO 8xxx

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Seminar (3 credits)
Select a seminar with approval of the Studies in Africa and African Diaspora director of graduate studies. Seminars not listed below may be chosen in consultation with the Studies in Africa and African Diaspora director of graduate studies.
AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
Twin Cities Campus
Studies of Science and Technology Minor
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Studies of Science and Technology, 746 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455; (612-625-6635; fax: 612-626-8380)
Email: mcps@umn.edu
Website: https://cla.umn.edu/mcps/research/sst-graduate-minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Studies of science and technology (SST) deals with a rapidly expanding field that seeks to understand the conceptual foundations, historical development, and social dimensions and context of science and technology. SST faculty are drawn from a number of research and teaching units dedicated in whole or in part to the history, philosophy, and social studies of science and technology.

The SST graduate minor is for students from any major who want to gain a deeper understanding of the nature and development of science and technology. It can be particularly valuable for students who are planning teaching careers in science or engineering, or those majoring in philosophy or history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Studies of Science and Technology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each.

The minimum cumulative GPA for minor field coursework is 3.00.

History Course (3 credits)
Select 1 of the following courses in consultation with the SST director of graduate studies:
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)

Philosophy Course (3 credits)
Select 1 of the following courses in consultation with the SST director of graduate studies:
PHIL 8602 - Scientific Representation and Explanation (3.0 cr)
PHIL 8610 - Seminar: History of Modern Physical Sciences (3.0 cr)
PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)
Colloquium (1 or 3 credits)
Masters students take the colloquium once; doctoral students take it twice.
SST 8000 - Colloquium (1.5 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Additional Coursework (3 credits)
Select 3 credits from the following, in consultation with the SST director of graduate studies, to complete the 12-credit minimum:
SST 8000 - Colloquium (1.5 cr)
SST 8100 - Seminar: Models, Theories, and Reality (3.0 cr)
SST 8200 - Seminar: Philosophy of the Physical Sciences (3.0 cr)
SST 8300 - Seminar: The Biological and Biomedical Sciences (3.0 cr)
SST 8400 - Seminar: Science, Technology, and Society (3.0 cr)
SST 8420 - Seminar: Social and Cultural Studies of Science (3.0 cr)
Twin Cities Campus
Technical Communication Postbaccalaureate Certificate
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 Nolte Center, 315 Pillsbury Drive SE, Minneapolis, MN 55455; (612-624-3445; fax: 612-624-3617)
Email: writgpc@umn.edu
Website: https://cla.umn.edu/writing-studies

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Technical Communication PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Writing Studies trains students to understand how people use written communication (digital, visual, textual) to shape the world around them, with a particular emphasis on communication in scientific and technical areas. The Certificate in Technical Communication focuses on applying basic theory and research-driven approaches to create and adapt content to solve complex problems in technical communication workplaces. Students connect with workplace professionals through client projects, virtual and global teamwork, mentorships, and emerging technologies. These experiences enable students to develop unique strengths in digital, usability, and science/health/medical communication.

Certificate courses are taught by graduate faculty who themselves have active research agendas in these areas. Students also have the opportunity to work with the Technical Communication Advisory Board (TCAB), a group of business leaders who provide pathways to experiential learning opportunities including networking, mentoring, and internships.

This fully online program equips professionals for transition to the technical communication field and/or serves as the foundation for specialized study at the masters level that is tailored to career goals. All coursework from the Certificate can be applied to the MS in Scientific and Technical Communication upon admission to the MS and with program approval.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 2.80 is required for students to remain in good standing.

A minimum grade of B- is required for each course applied to the certificate.

**Fall Term Courses (6 credits)**
Take the following courses:
- WRIT 5001 - Introduction to Graduate Studies in Scientific and Technical Communication (3.0 cr)
- WRIT 5662 - Writing With Digital Technologies (3.0 cr)

**Spring Term Courses (6 credits)**
Take the following courses:
- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 5501 - Usability and Human Factors in Technical Communication (3.0 cr)

**Summer Term Course (3 credits)**
Take the following course:
- WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
Twin Cities Campus
Theatre Arts M.A.
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Ave S, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30 to 40
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department's work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 24 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: The Plan B requirement comprises three Plan B papers completed in consultation with the advisor and director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 2.80 is required for students to remain in good standing.

**Signature Seminars (6 credits)**
Take the following courses, or take TH 8120 twice to complete this 6-credit requirement.
- TH 8120 - Seminar (3.0 cr)
- TH 5117 - Performance and Social Change (3.0 cr)

**Field Seminars (6 credits)**
Select 6 credits from the following in consultation with the advisor:
- TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)
- TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)
- TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)
- TH 8114 - Theatre: Performance and Political Modernity (3.0 cr)
- TH 8115 - History and Theory of Western Theatre: 20th Century Through World War II (3.0 cr)
- TH 8116 - History and Theory of Western Theatre: 20th Century From 1945 to the Present (3.0 cr)

**Pedagogy and Professionalization Course (3 credits)**
Take TH 8950 for 3 credits.
- TH 8950 - Topics in Theatre (1.0 - 4.0 cr)

**Historiography Seminar (3 credits)**
Take the following course:
- TH 8102 - Theatre Historiography (3.0 cr)

**Electives (6 credits)**
Select 6 credits from within Theatre Arts in consultation with the advisor.

**Outside Coursework (6 credits)**
Select 6 credits from outside Theatre Arts in consultation with the advisor.

**Plan Options**

**Plan A**

**Thesis Credits**
Take 10 master's thesis credits.
- TH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Theatre Arts M.F.A.
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://cla.umn.edu/theatre

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The three-year, performance-oriented, terminal MFA degree specializes in design and technical production. All areas of design are studied to increase understanding in specialization areas, and technology is studied as an essential part of design. Students are expected to achieve proficiency in at least two areas of any combination of design and technology (scenery/properties, costuming, lighting, sound) and a level of expertise in at least one of these areas.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Portfolio review by the Theatre Arts design/technology faculty

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 57 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.
Capstone Project: A realized technology or design project.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Major field coursework offered on both the A-F and S/N grade basis must be taken A-F.

**Foundational Courses (6 credits)**
Take the following courses:
- TH 5510 - Drawing, Rendering, and Painting for the Theatre Designer I (3.0 cr)
- TH 5560 - Drawing, Rendering, and Painting for the Theatre Designer II (3.0 cr)

**Design Courses (9 credits)**
Select two of the following courses in consultation with the advisor. Repeat one of the two considered to be the primary design area.
- TH 5520 - Scene Design (3.0 cr)
- TH 5530 - Costume Design (3.0 cr)
- TH 5540 - Lighting Design for the Theatre (3.0 cr)
- TH 5559 - Sound Design for Performance (3.0 cr)

**Design/Technology Practicums (6 credits)**
Take 6 credits from the following, in any combination, in consultation with the advisor:
- TH 5500 - Theatre Design Practicum (1.0 - 3.0 cr)
- TH 5590 - Theatre Technology Practicum (1.0 - 3.0 cr)
- TH 8500 - Theatre Design Practicum (1.0 - 3.0 cr)
- TH 8590 - Theatre Technology Practicum (1.0 - 3.0 cr)

**Electives (9 credits)**
Select 9 credits from the following in consultation with the advisor:
- TH 4555 - Audio Technology (3.0 cr)
- TH 5355 - Puppetry: Techniques and Practice in Contemporary Theater (3.0 cr)
- TH 5520 - Scene Design (3.0 cr)
- TH 5530 - Costume Design (3.0 cr)
- TH 5540 - Lighting Design for the Theatre (3.0 cr)
- TH 5545 - Stage Lighting Technology (3.0 cr)
- TH 5554 - Multimedia Production for Live Performance (3.0 cr)
- TH 5556 - Audio Engineering (3.0 cr)
- TH 5559 - Sound Design for Performance (3.0 cr)
- TH 5570 - Properties/Scenery Technology (1.0 - 3.0 cr)
- TH 5580 - Costume Technology (3.0 cr)
- TH 5950 - Topics in Theatre (1.0 - 4.0 cr)
- TH 5993 - Directed Study (1.0 - 5.0 cr)
- TH 8950 - Topics in Theatre (1.0 - 4.0 cr)
- TH 8994 - Directed Research (1.0 - 5.0 cr)

**Professional Development Course (12 credits)**
Take 3 credits of TH 8510, in consultation with the advisor, 4 times within 3 years.
- TH 8510 - Professional Design Workshop (1.0 - 3.0 cr)

**Internship (3 credits)**
Take TH 8980 in consultation with the advisor.
- TH 8980 - Internship (1.0 - 5.0 cr)

**History of Literature within the Field (6 credits)**
Select 6 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor approval.
- TH 4177W - Analysis of Dramatic Literature [WI] (3.0 cr)
- TH 5103 - The Theatre Dramaturg (3.0 cr)
- TH 5117 - Performance and Social Change (3.0 cr)
- TH 5179W - Text and Performance [WI] (3.0 cr)
- TH 5181W - Blacks in American Theatre [WI] (3.0 cr)
- TH 5182W - Contemporary Black Drama and Dramaturgies [WI] (3.0 cr)
- TH 5183 - Critical Literacy, Storytelling, and Creative Drama (3.0 cr)
- TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)
- TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)
TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)
TH 8114 - Theatre: Performance and Political Modernity (3.0 cr)
TH 8115 - History and Theory of Western Theatre: 20th Century Through World War II (3.0 cr)
TH 8116 - History and Theory of Western Theatre: 20th Century From 1945 to the Present (3.0 cr)
TH 8120 - Seminar (3.0 cr)

**MFA Creative Thesis (3 credits)**
Take 3 credits of the following in consultation with the advisor.
TH 8990 - MFA Creative Thesis (3.0 - 4.0 cr)

**Outside Coursework (6 credits)**
Select at least 6 credits outside Theatre Arts in consultation with the advisor.
Twin Cities Campus
Theatre Arts Minor
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Ave S, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a minor in Theatre Arts, drawing from the varied research and creative expertise of its MA/PhD and MFA faculty. Students create a customized program by selecting courses to support the following: scholarly research related to performance, theatre, drama, or dance; creative practice that involves performance, stage design or technology; or professional development in other fields, such as education or social work, in which expertise in performance theory or practice is an asset.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Theatre Arts director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework is chosen in consultation with the Theatre Arts director of graduate studies.

The minimum cumulative GPA for minor field coursework is 3.5.

Required Coursework (9 to 12 credits)
Master's students select 9 credits, and doctoral students select 12 credits in consultation with the Theatre Arts director of graduate studies.
TH 5xxx
TH 8xxx

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.
Masters

Doctoral
Twin Cities Campus
Theatre Arts Ph.D.
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Ave S, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department’s work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning-production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Accreditation
This program is accredited by National Association of Schools of Theatre (NAST).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Applicants must demonstrate working knowledge and reading proficiency of at least one foreign language or sign language.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
18 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Proficiency in one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Signature Seminars (6 credits)**
Take the following courses, or take TH 8120 twice to complete this 6-credit requirement.
- **TH 8120 - Seminar (3.0 cr)**
- **TH 5117 - Performance and Social Change (3.0 cr)**

**Field Seminars (6 credits)**
Select 6 credits from the following in consultation with the advisor:
- **TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)**
- **TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)**
- **TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)**
- **TH 8114 - Theatre: Performance and Political Modernity (3.0 cr)**
- **TH 8115 - History and Theory of Western Theatre: 20th Century Through World War II (3.0 cr)**
- **TH 8116 - History and Theory of Western Theatre: 20th Century From 1945 to the Present (3.0 cr)**

**Pedagogy and Professionalization Seminar (3 credits)**
Take TH 8950 for 3 credits.
- **TH 8950 - Topics in Theatre (1.0 - 4.0 cr)**

**Historiography Seminar (3 credits)**
Take the following course:
- **TH 8102 - Theatre Historiography (3.0 cr)**

**Outside Coursework (12 credits)**
6 credits should be within the department, 6 credits from outside in consultation with the advisor.

**Thesis Credits**
Take 24 doctoral thesis credits.
- **TH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**
Twin Cities Campus

Translational Sensory Sciences Minor
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Applied & Translational Sensory Science
S39 Elliott Hall
75 East River Parkway
Minneapolis, MN
Email: catss@umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2022
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The translational sensory sciences minor provides students with a focused, multidisciplinary educational background and research training opportunities to address critical challenges in the development of assistive technologies that meaningfully improve the lives of people with sensory disabilities.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Translational Sensory Sciences director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of C+ earned for each course.

Required Courses (5 credits)
Take the following courses:
GCC 5022 - The Human Experience of Sensory Loss: Seeking Equitable and Effective Solutions [TS] (3.0 cr)
CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)

Electives (7 credits)
Select 7 credits from the following, in consultation with the Translational Sensory Sciences director of graduate studies, to complete the 12-credit minimum. Other courses may be applied to this requirement with approval of the Translational Sensory Sciences director of graduate studies.
BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
KIN 8211 - Seminar: Perception and Action (3.0 cr)
OTOL 8234 - Anatomy of the Head and Neck and Temporal Bone Dissection (2.0 cr)
PSY 5031W - Perception [WI] (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
PSY 8041 - Proseminar in Perception (3.0 cr)
SLHS 5804 - Cochlear Implants (3.0 cr)
SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
SLHS 5808 - Pathophysiology of Hearing Disorders (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Experimental and Clinical Pharmacology M.S.
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-115 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-2160)
Email: grad-ecp@umn.edu
Website: https://z.umn.edu/ecpgrad

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, neuroscience/neuropharmacology, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A U.S. bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

Other requirements to be completed before admission:
All international students who are non-English speakers are required to submit TOEFL scores. TOEFL test date must be within 2 years of program start. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement. GRE required by all students except for applicants that have completed a PharmD at a U.S.-accredited institution.

Special Application Requirements:
Students are generally admitted to the ECP program for fall semester only. All application materials should be submitted by the admissions deadline listed on the departmental website. Applications received after the application deadline will be considered on a space-available basis only.

Application to the ECP program at the University of Minnesota is done entirely online.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

The preferred English language test is Test of English as Foreign Language.
Program Requirements

Plan A: Plan A requires 24 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 34 major credits and up to null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Courses (8 credits)
Take the following courses. Take ECP 8982 twice for a total of 2 credits.

- ECP 5220 - Regulatory Issues in Drug Research (2.0 cr)
- ECP 8230 - Principles of Clinical Pharmacology (2.0 cr)
- ECP 8983 - Scientific Communications in Experimental and Clinical Pharmacology (1.0 cr)
- ECP 8982 - Inter-Institutional Journal Club in Translational Research (1.0 cr)
- ECP 8100 - Seminar (1.0 cr)

Statistical Analysis (4 credits)
Select at least one of the following courses in consultation with the advisor. Two courses are preferred and will count towards Electives or Focus Area.

- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- STAT 5101 - Theory of Statistics I (4.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)

Electives
Select electives, in consultation with the director of graduate studies and/or the advisor, to complete the master's minimum credit requirement.

- ANAT 5xxx
- ANAT 6xxx
- ANAT 7xxx
- ANSC 5xxx
- ANSC 8xxx
- BBE 5xxx
- BBE 6xxx
- BICB 5xxx
- BICB 8xxx
- BINF 5xxx
- BIOC 5xxx
- BIOC 6xxx
- BIOL 5xxx
- BIOL 6xxx
- BIOL 8xxx
- BMEN 5xxx
- BMEN 8xxx
- BMSC 8xxx
- BTHX 5xxx
- BTHX 8xxx
- CGSC 8xxx
- CHEM 5xxx
- CHEM 8xxx
- CLS 5xxx
- CLS 8xxx
Focus Areas

Plan A
Take exactly 10 credit(s) from the following:
- **ECP 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)
  - OR -

Plan B
Take 10 project credits.
**ECP 8776** - Project Credits: Master's Plan B (1.0 - 18.0 cr)
  - OR -
Focus Area -- Pharmacometrics (12 credits)
Coursework chosen from the following list, or other courses to meet the 12-credit focus area requirement, are selected in consultation with the advisor.

ECP 8500 - Advances in Pharmacometrics Modeling and Simulation (1.0 cr)
ECP 8501 - Pharmacometrics (2.0 cr)
ECP 8502 - Introductory Population Pharmacokinetic Methods (2.0 cr)
ECP 8503 - Intermediate Population PK/PD Methods (2.0 cr)
ECP 8504 - Modeling Biologics (2.0 cr)
ECP 8505 - Application of physiological-based pharmacokinetic modeling (PBPK) to model-informed drug development (2.0 cr)
ECP 8506 - Clinical Trial Simulation (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)

-OR-

Focus Area -- Neuroscience/Neuropharmacology (12 credits)
Coursework chosen from the following list, or other courses to meet the 12-credit focus area requirement, are selected in consultation with the advisor.

NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
NSCI 5501 - Neurodegenerative Diseases, Mechanisms to Therapies (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
Neuro-Immune Interactions
CMB 8361 - Neuro-Immune Interactions (3.0 cr)
or NSC 8026 - Neuro-Immune Interactions (3.0 cr)
or PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
Advanced Neuropharmaceutics
CMB 8481 - Advanced Neuropharmaceutics (4.0 cr)
or NSC 8481 - Advanced Neuropharmaceutics (4.0 cr)
or PHM 8481 - Advanced Neuropharmaceutics (4.0 cr)

-OR-

Focus Area -- Infectious Diseases (12 credits)
Coursework chosen from the following list, or other courses to meet the 12-credit focus area requirement, are selected in consultation with the advisor.

ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8010 - Microbial Pathogenesis (3.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

-OR-

Focus Area -- Pharmacogenomics Research (12 credits)
Coursework chosen from the following list, or other courses to meet the 12-credit focus area requirement, are selected in consultation with the advisor.

ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
ECP 8900 - Advanced Topics in Experimental and Clinical Pharmacology (1.0 - 4.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 4143 - Human Genetics and Genomics (3.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

-OR-

Focus Area -- Applied Pharmacogenomics (12 credits)
This focus area is offered as Plan B only. Coursework chosen from the following list, or other courses to meet the 12-credit focus area requirement, are selected in consultation with the advisor.

BTHX 8114 - Ethical and Legal Issues in Genetic Counseling (2.0 cr)
GCD 5914 - Ethical and Legal Issues in Genetic Counseling (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
NURS 7051 - Data Science for Healthcare (2.0 cr)
NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PHAR 6962 - Ethics in Pharmacy Practice (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 7533 - Leading with Impact in Healthcare (1.0 cr)
PUBH 7551 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 7556 - Health and Health Systems (2.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 8816 - Implementation Science (2.0 cr)
SAPH 8235 - Pharmaceutical Economics and Policy (3.0 cr)
SAPH 8610 - Pharmacoepidemiology (3.0 cr)
SAPH 8700 - Hospital Pharmacy Administration (3.0 cr)
Twin Cities Campus

Experimental and Clinical Pharmacology Ph.D.

Experimental and Clinical Pharmacology

College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-115 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-2160)
Email: grad-ecp@umn.edu
Website: https://z.umn.edu/ecpgrad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, neuroscience/neuropharmacology, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A US bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had a professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

Other requirements to be completed before admission:
All international students who are non-English speakers are required to submit TOEFL scores. TOEFL test date must be within 2 years of program start. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement. GRE required by all students except for applicants that have completed a PharmD at a U.S.-accredited institution.

Special Application Requirements:
Students are generally admitted to the ECP program for fall semester only. All application materials should be submitted by the admissions deadline listed on the departmental website. Applications received after the application deadline will be considered on a space-available basis only.

Application to the ECP program at the University of Minnesota is done entirely online.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

24 credits are required in the major.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Required Courses (9 credits)**

Take the following courses. Take ECP 8982 twice for a total of 2 credits, and take ECP 8100 2 times for a total of 2 credits.

- **ECP 5220** - Regulatory Issues in Drug Research (2.0 cr)
- **ECP 8230** - Principles of Clinical Pharmacology (2.0 cr)
- **ECP 8983** - Scientific Communications in Experimental and Clinical Pharmacology (1.0 cr)
- **ECP 8982** - Inter-Institutional Journal Club in Translational Research (1.0 cr)
- **ECP 8100** - Seminar (1.0 cr)

**Statistical Analysis (4 credits)**

Select at least one of the following courses in consultation with the advisor. Two courses are preferred and will count towards Electives or Focus Area.

- **PUBH 6450** - Biostatistics I (4.0 cr)
- **PUBH 6451** - Biostatistics II (4.0 cr)
- **STAT 5101** - Theory of Statistics I (4.0 cr)
- **STAT 5102** - Theory of Statistics II (4.0 cr)

**Electives**

Take additional courses, in consultation with the director of graduate studies and/or advisor to complete the 24 course credits required.

- **ANAT 5xxx**
- **ANAT 6xxx**
- **ANAT 7xxx**
- **ANSC 5xxx**
- **ANSC 8xxx**
- **BBE 5xxx**
- **BBE 8xxx**
- **BICB 5xxx**
- **BICB 8xxx**
- **BINF 5xxx**
- **BIOC 5xxx**
- **BIOC 6xxx**
- **BIOC 8xxx**
- **BIOL 5xxx**
- **BIOL 6xxx**
- **BIOL 8xxx**
- **BMEN 5xxx**
- **BMEN 8xxx**
- **BMSC 8xxx**
- **BTHX 5xxx**
- **BTHX 8xxx**
- **CGSC 8xxx**
- **CHEM 5xxx**
- **CHEM 8xxx**
- **CLS 5xxx**
- **CLS 8xxx**
- **CMB 5xxx**
- **CMB 8xxx**
ECHO 4xxx
ECP 5xxx
ECP 8xxx
EEB 5xxx
EEB 8xxx
GCD 5xxx
GCD 6xxx
GCD 8xxx
HINF 5xxx
HINF 8xxx
MATH 5xxx
MATH 8xxx
MCDC 8xxx
MEDC 5xxx
MEDC 8xxx
MICA 8xxx
NSC 5xxx
NSC 8xxx
NSCI 5xxx
NSCI 6xxx
NURS 5xxx
NURS 6xxx
NURS 7xxx
NURS 8xxx
PHAR 5xxx
PHAR 6xxx
PHAR 7xxx
PHCL 5xxx
PHCL 8xxx
PHM 5xxx
PHM 6xxx
PHM 8xxx
PHSL 5xxx
PHSL 6xxx
PHSL 8xxx
PUBH 5xxx
PUBH 6xxx
PUBH 7xxx
PUBH 8xxx
SAPH 5xxx
SAPH 8xxx
SCB 5xxx
SCB 8xxx
SCIC 8xxx
STAT 5xxx
STAT 8xxx
TXCL 5xxx
TXCL 8xxx
VMED 5xxx
VMED 8xxx

Thesis Credits
Take exactly 24 credit(s) from the following:
- ECP 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Focus Areas

Pharmacometrics (11 credits)
Coursework chosen from the following list, or other courses to meet the 11-credit focus area requirement, are selected in consultation with the advisor.
- ECP 8500 - Advances in Pharmacometrics Modeling and Simulation (1.0 cr)
or ECP 8501 - Pharmacometrics (2.0 cr)
or ECP 8502 - Introductory Population Pharmacokinetic Methods (2.0 cr)
or ECP 8503 - Intermediate Population PK/PD Methods (2.0 cr)
or ECP 8504 - Modeling Biologics (2.0 cr)
or ECP 8505 - Application of physiological-based pharmacokinetic modeling(PBPK) to model-informed drug development (2.0 cr)
or ECP 8506 - Clinical Trial Simulation (2.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
or PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
or PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
or PUBH 7450 - Survival Analysis (3.0 cr)
or STAT 5101 - Theory of Statistics I (4.0 cr)
or STAT 5102 - Theory of Statistics II (4.0 cr)

-OR-

Neuroscience/Neuropharmacology (11 credits)
Coursework chosen from the following list, or other courses to meet the 11-credit focus area requirement, are selected in consultation with the advisor.
NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
NSCI 5501 - Neurodegenerative Diseases, Mechanisms to Therapies (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Neuro-Immune Interactions
CMB 8361 - Neuro-Immune Interactions (3.0 cr)
NSC 8026 - Neuro-Immune Interactions (3.0 cr)
PHCL 8026 - Neuro-Immune Interactions (3.0 cr)

Advanced Neuropharmaceutics
CMB 8481 - Advanced Neuropharmaceutics (4.0 cr)
NSC 8481 - Advanced Neuropharmaceutics (4.0 cr)
PHM 8481 - Advanced Neuropharmaceutics (4.0 cr)

-OR-

Infectious Diseases (11 credits)
Coursework chosen from the following list, or other courses to meet the 11-credit focus area requirement, are selected in consultation with the advisor.
ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
or MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
or MICA 8003 - Immunity and Immunopathology (4.0 cr)
or MICA 8010 - Microbial Pathogenesis (3.0 cr)
or PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

-OR-

Pharmacogenomics Research (11 credits)
Coursework chosen from the following list, or other courses to meet the 11-credit focus area requirement, are selected in consultation with the advisor.
ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
ECP 8900 - Advanced Topics in Experimental and Clinical Pharmacology (1.0 - 4.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 4143 - Human Genetics and Genomics (3.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
Twin Cities Campus
Medicinal Chemistry M.S.
Graduate Studies in Medicinal Chemistry
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-624-9919; fax: 612-626-3114)
Email: medchem@umn.edu
Website: http://z.umn.edu/medchemgrad

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly to the MS program. See the Medicinal Chemistry PhD or contact the Director of Graduate Studies for more information.

The medicinal chemistry program emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling.

Students must complete a core curriculum of advanced courses in organic and medicinal chemistry, as well as credits in a minor or related field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Note: Students are not admitted directly to the M.S. program. See the Medicinal Chemistry Ph.D.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.
Students must take all courses for an A-F grade, unless the course is only offered on the S/N grading basis.

**Required Courses (15 credits)**
Take the following courses:
- MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
- MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
- MEDC 8050 - Physical and Mechanistic Organic Chemistry (2.0 cr)
- MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
- MEDC 8900 - Directed Studies in Medicinal Chemistry (1.0 - 10.0 cr)
- CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
- CHEM 8321 - Organic Synthesis (4.0 cr)

**Biochemistry Requirement (2 to 4 credits)**
Select one of the following 2- to 4-credit courses in consultation with the advisor. A substitute course can be selected with approval of the advisor and director of graduate studies.
- BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
- BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
- BIOC 5535 - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- CHEM 8411 - Introduction to Chemical Biology (4.0 cr)

**Additional Courses to Satisfy Elective Requirement**
Select remaining courses in consultation with the advisor to complete the 20 course credits required for the Plan A, or the 30-credit requirement for the Plan B. At least one course must be selected from the following options.
- MEDC 5185 - Principles of Biomolecular Simulation (3.0 cr)
- MEDC 5485 - Drug Metabolism and Pharmacokinetics (3.0 cr)
- MEDC 5494 - Advanced Methods in Quantitative Drug Analysis (2.0 cr)
- MEDC 8070 - The Chemistry and Biology of Infectious Diseases (3.0 cr)
- MEDC 8401 - Chemistry of Counterterrorism: Chemical, Biological, Radiological, Nuclear & High Explosive Threats (2.0 cr)
- MEDC 8413 - Chemistry of Nucleic Acids (4.0 cr)
- MEDC 8420 - Natural Products Chemistry (3.0 cr)
- MEDC 8461 - Design of Cancer Therapeutics (3.0 cr)
- MEDC 8471 - High Throughput Drug Discovery (3.0 cr)
- MEDC 8700 - Advanced Concepts in Drug Design (2.0 cr)
- MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
- CHEM 8322 - Advanced Organic Chemistry (4.0 cr)

**Thesis Credits**
Take at least 10 masters thesis credits.
- MEDC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
**Twin Cities Campus**

**Medicinal Chemistry Ph.D.**

**Graduate Studies in Medicinal Chemistry**

**College of Pharmacy**

Link to a list of faculty for this program.

**Contact Information:**
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-626-3114)  
Email: medchem@umn.edu  
Website: [http://z.umn.edu/medchemgrad](http://z.umn.edu/medchemgrad)

- **Program Type:** Doctorate  
- **Requirements for this program are current for Fall 2022**  
- **Length of program in credits:** 48  
- **This program does not require summer semesters for timely completion.**  
- **Degree:** Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The program in medicinal chemistry emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling.

**Program Delivery**

This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:

Applicants should have a BS or MS degree in an appropriate related science field such as pharmacy, chemistry, or biology. Students majoring in other degree programs that encompass chemical, biochemical, or biological fields of study are also encouraged to apply. All applicants should have completed undergraduate chemistry through elementary organic chemistry. Undergraduate coursework in biochemistry and physical chemistry is also a prerequisite, but under certain circumstances such coursework may be taken during the first year. Students may apply for admission to the PhD program only and are only admitted fall semester.

**Special Application Requirements:**

Scores from the General (Aptitude) Test of the GRE, three letters of recommendation from college-level faculty, a complete set of official transcripts, and a statement of immediate and long range career objectives are required. All application materials should be submitted by the admissions deadline listed on the departmental website in order to be considered for fellowship, teaching, and research assistantships awarded in the next academic year.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 95
- **IELTS**
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements

24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must take all courses for an A-F grade, unless the course is only offered on the S/N grading basis.

Required Courses (15 credits)
- MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
- MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
- MEDC 8050 - Physical and Mechanistic Organic Chemistry (2.0 cr)
- MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
- MEDC 8100 - Medicinal Chemistry Seminar (1.0 cr)
- CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
- CHEM 8321 - Organic Synthesis (4.0 cr)

Biochemistry Requirement (2 to 4 credits)
Take at least one of the following courses or select a different 2 to 4 credit course in consultation with the advisor and director of graduate studies.
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- BIOC 5535 - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)
- BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
- BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
- CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
- GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)

Additional Course Requirements
Take three additional courses, two of which must be from the following list, to complete the 24 course-credit requirement.
- CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
- MEDC 5185 - Principles of Biomolecular Simulation (3.0 cr)
- MEDC 5485 - Drug Metabolism and Pharmacokinetics (3.0 cr)
- MEDC 5494 - Advanced Methods in Quantitative Drug Analysis (2.0 cr)
- MEDC 8070 - The Chemistry and Biology of Infectious Diseases (3.0 cr)
- MEDC 8401 - Chemistry of Counterterrorism: Chemical, Biological, Radiological, Nuclear & High Explosive Threats (2.0 cr)
- MEDC 8413 - Chemistry of Nucleic Acids (4.0 cr)
- MEDC 8420 - Natural Products Chemistry (3.0 cr)
- MEDC 8461 - Design of Cancer Therapeutics (3.0 cr)
- MEDC 8471 - High Throughput Drug Discovery (3.0 cr)
- MEDC 8700 - Advanced Concepts in Drug Design (2.0 cr)
- MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
- MEDC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Pharmaceutics M.S.
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics
Room 9-177 Weaver-Densford Hall
308 Harvard Street SE
Minneapolis, MN 55455
USA
Phone: 612-624-5151
Fax: 612-626-2125
Email: pceuts@umn.edu
Website: http://pharmacy.umn.edu/pharmaceutics

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Other requirements to be completed before admission: Undergraduate (and graduate, if applicable) scholastic records, a statement of career goals and research interests, and three letters of recommendation. A US grade point average of at least 3.2 on a 4.0 scale, or the equivalent from foreign institutions, is considered to be competitive.

International applicants must submit results from the TOEFL (with a preferred minimum 100 total score and 23 speaking score, and a required minimum 21 writing score and 19 reading score) or IELTS (with a required minimum 6.5 total score, 6.5 reading score, and 6.5 writing score, and a preferred 6.5 speaking score).

All of the above are collectively used to determine each candidate's admissibility. Fall admission is highly preferred and the deadline to apply is November 30.

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of B- earned for each.

Required Background:
Students must demonstrate sufficient background knowledge in Pharmacology. Equivalent coursework or previous experience, with approval of the program faculty, may be substituted in lieu of required background coursework.

Required Courses (8 credits)
Pharmaceutics Modules (4 credits)
Take the following courses:
- PHM 8210 - Pharmacokinetics Module (1.0 cr)
- PHM 8220 - Physical Pharmacy Module I (1.0 cr)
- PHM 8230 - Physical Pharmacy Module II (1.0 cr)
- PHM 8240 - Biopharmaceutics Module (1.0 cr)
Pharmaceutics 84xx Courses (4 credits)
Select one of the following courses in consultation with the advisor:
- PHM 8421 - Advanced Pharmacokinetics (4.0 cr)
- PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- PHM 8441 - Solubility and Solid-State Properties of Drugs (4.0 cr)
- PHM 8481 - Advanced Neuropharmaceutics (4.0 cr)

Electives (6 credits)
Take at least 6 credits of electives in the major, which can include PHAR-designated courses noted below taken to satisfy the background knowledge requirement, or other PHAR- and PHM-designated coursework. All courses must be selected in consultation with the advisor.

Pharmacology Background
- PHAR 6726 - Principles of Pharmacology (2.3 cr)
- PHAR 6762 - Medicinal Chemistry and Neuropharmacology (2.8 cr)

Outside Coursework (6 credits)
Take at least 6 credits of coursework outside the major, which can include non-PHAR- and non-PHM-designated courses noted below taken to satisfy the background knowledge requirement, or other non-PHAR- and non-PHM-designated coursework. All courses must be selected in consultation with the advisor.

Pharmacology Background
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- PHCL 5110 - Introduction to Pharmacology (3.0 cr)

Thesis Credits
Take 10 master's thesis credits.
- PHM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Pharmaceutics Minor
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics
Room 9-177 Weaver-Densford Hall
308 Harvard Street SE
Minneapolis, MN 55455
USA
Phone: 612-624-5151
Fax: 612-626-2125
Email: pceuts@umn.edu
Website: http://pharmacy.umn.edu/pharmaceutics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics.

Program Delivery
This program is available:
  • via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor Coursework (6-12 credits)
  Master's students choose 6 credits and doctoral students complete 12 credits in consultation with the Pharmaceutics director of graduate studies.
  PHAR 6xxx
  PHM 8xxx

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

  Doctoral

  Masters
Twin Cities Campus
Pharmaceutics Ph.D.
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics
Room 9-177 Weaver-Densford Hall
308 Harvard Street SE
Minneapolis, MN 55455
USA
Phone: 612-624-5151
Fax: 612-626-2125
Email: pceuts@umn.edu
Website: http://pharmacy.umn.edu/pharmaceutics

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics. Minor fields of particular value include biochemistry, biomedical engineering, biometry, chemistry, chemical engineering, mechanical engineering, molecular biology, pharmacology, and statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Other requirements to be completed before admission:
Undergraduate (and graduate, if applicable) scholastic records, a statement of career goals and research interests, and three letters of recommendation. A US grade point average of at least 3.2 on a 4.0 scale, or the equivalent from foreign institutions, is considered to be competitive.

International applicants must submit results from the TOEFL (with a preferred minimum 100 total score and 23 speaking score, and a required minimum 21 writing score and 19 reading score) or IELTS (with a required minimum 6.5 total score, 6.5 reading score, and 6.5 writing score, and a preferred 6.5 speaking score).

All of the above are collectively used to determine each candidate's admissibility. Fall admission is highly preferred and the deadline to apply is November 30.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
16 credits are required in the major.
8 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Successful completion of program examinations and timely progress towards the degree are also required for students to remain in good standing.

Required Background:
Students must demonstrate sufficient background knowledge in each of the following areas: Pharmacy, Math, and Statistics. Equivalent coursework or previous experience, with approval of the program faculty, may be substituted in lieu of required background coursework.

Required Courses
Pharmaceutics Modules
- PHM 8210 - Pharmacokinetics Module (1.0 cr)
- PHM 8220 - Physical Pharmacy Module I (1.0 cr)
- PHM 8230 - Physical Pharmacy Module II (1.0 cr)
- PHM 8240 - Biopharmaceutics Module (1.0 cr)

Pharmaceutics Seminar
Register for 1 credit each semester in which presenting a seminar and for a total of 2 credits.
- PHM 8100 - Seminar: Pharmaceutics (1.0 cr)

Pharmaceutics Graduate Courses: 81xx
Take two courses for a total of 2 credits from the following list:
- PHM 8110 - Readings in Pharmaceutics (1.0 cr)
- PHM 8120 - Readings in Central Nervous System (CNS) Drug Delivery (1.0 cr)
- PHM 8150 - Pharmacokinetics Research Seminar (1.0 cr)

Pharmaceutics Graduate Courses: 84xx
Choose two courses from the following list for at least 8 credits:
- PHM 8421 - Advanced Pharmacokinetics (4.0 cr)
- PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- PHM 8441 - Solubility and Solid-State Properties of Drugs (4.0 cr)
- PHM 8481 - Advanced Neuropharmaceutics (4.0 cr)

Outside Coursework
Take at least 8 credits of coursework outside the major, which can include non-PHAR- and non-PHM-designated courses noted below taken to satisfy the background knowledge requirement, or other non-PHAR- and non-PHM-designated coursework. All courses must be selected in consultation with the advisor.

Pharmacy Background
- PHCL 5110 - Introduction to Pharmacology (3.0 cr)

Math Background
- MATH 4512 - Differential Equations with Applications (3.0 cr)

Statistics Background
- PUBH 6450 - Biostatistics I (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5101 - Theory of Statistics I (4.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
- PHM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Social and Administrative Pharmacy M.S.
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax: 612-625-9931)
Email: cremi001@umn.edu
Website: http://z.umn.edu/saphgrad

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Study within the Social and Administrative Pharmacy Program is tailored carefully to the specific needs and objectives of the student. It is a flexible, interdisciplinary program which utilizes all resources of the University's many outstanding departments in an effort to provide the student with knowledge and experience in areas she/he feels are applicable to the resolution of pharmacy-oriented problems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Although the majority of students in the program are pharmacists, a pharmacy education is not required. A bachelor's degree or its foreign equivalent from a recognized college of pharmacy and a strong scholastic record are desirable. Individuals from other fields such as economics, engineering, computer science, medicine, psychology, sociology, or public health may be admitted if their undergraduate coursework satisfies the prerequisites for graduate coursework.

Special Application Requirements:
Applicants must complete a supplementary application form in addition to the University application. The supplementary form along with three letters of recommendation should be uploaded to the University's online application. GRE scores are required and a performance level of 580 (158 for November 1, 2011-June 30, 2012) is preferred on the TOEFL for all international applicants whose native language is not English.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 16 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B also requires two papers of publishable quality; one paper must include a research component with an analysis of data.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Courses (16 credits)
All MS students must complete the following courses for 16 credits and take all courses for an A-F grade. Students are required to complete SAPH 8100 (1 credit) 2 times.

SAPH 5100 - Pro-Seminar (1.0 cr)
SAPH 8100 - Seminar (1.0 cr)
SAPH 8500 - Pharmacy and Its Environment (3.0 cr)
SAPH 8235 - Pharmaceutical Economics and Policy (3.0 cr)
SAPH 8420 - Social and Behavioral Aspects of Pharmacy Practice (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Outside Coursework (6 credits)
Select at least 6 credits outside the major, in consultation with the advisor.

Plan Options

Plan A
Plan A students must take at least 10 master's thesis credits.
SAPH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Plan B students must take at least 8 additional course credits, selected in consultation with the advisor, to complete the 30-credit minimum.
Twin Cities Campus
Social and Administrative Pharmacy Minor
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax: 612-625-9931)
Email: cremi001@umn.edu
Website: http://z.umn.edu/saphgrad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Social and Administrative Pharmacy Program are prepared for research and related activities investigating relationships between biological and physical factors in social settings that involve the drug use process. The flexible interdisciplinary program uses the resources of the many health and social science departments at the University, and may include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and mentored to become professional scientists. Those who complete the program will understand the process of conducting high-quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

Social and administrative pharmacy (SAPH) is the application of behavior-oriented interdisciplinary theories to pharmacy problem solving and pharmacy system development. This includes the study of the social, psychosocial, political, legal, public policy, historic, and economic factors that impinge upon the use, non-use, and abuse of drugs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

In addition to coursework, a written examination is required.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses (6 credits)
Courses must be selected in consultation with the minor field director of graduate studies.
Take exactly 2 course(s) from the following:
- SAPH 8235 - Pharmaceutical Economics and Policy (3.0 cr)
- SAPH 8420 - Social and Behavioral Aspects of Pharmacy Practice (3.0 cr)
Doctoral

Required Courses (9 credits)
Courses must be selected in consultation with the minor field director of graduate studies.
Take exactly 3 course(s) from the following:
• SAPH 8235 - Pharmaceutical Economics and Policy (3.0 cr)
• SAPH 8420 - Social and Behavioral Aspects of Pharmacy Practice (3.0 cr)
• SAPH 8500 - Pharmacy and Its Environment (3.0 cr)

Elective (3 credits)
Courses must be selected in consultation with the minor field director of graduate studies.
SAPH 8255 - Pharmaceutical Marketing (3.0 cr)
or SAPH 8610 - Pharmacoepidemiology (3.0 cr)
or SAPH 8810 - Social Psychology of Health Care (3.0 cr)
or SAPH 8840 - Social Measurement (3.0 cr)
Social and Administrative Pharmacy Ph.D.
Pharmaceutical Care and Health
College of Pharmacy

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax:612-625-9931)
Email: cremi001@umn.edu
Website: http://z.umn.edu/saphgrad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Social and administrative pharmacy (SAPH) is the application of behavior-oriented interdisciplinary theories to pharmacy problem solving and pharmacy system development. This includes the study of the social, psycho-social, political, legal, public policy, historic, and economic factors that impinge upon the use, non-use, and abuse of drugs.

Students in the Social and Administrative Pharmacy Program are prepared for research and related activities of investigating relationships between biological and physical factors in social settings that involve the drug use process. This flexible interdisciplinary program uses the resources of the many health and social science departments at the University, and may include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and mentored to become professional scientists. Those who complete the program will understand the process of conducting high-quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must complete a supplementary application form in addition to the University application. The supplementary form along with three letters of recommendation should be uploaded to the University's online application. GRE scores are required and a performance level of 580 (158 for November 1, 2011-June 30, 2012) is preferred on the TOEFL for all international applicants whose native language is not English.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses (23 credits)
All PhD students must complete the following courses for 23 credits and take all courses for an A-F grade. Students are required to complete SAPH 8100 (1 credit) 8 times.

- SAPH 5100 - Pro-Seminar (1.0 cr)
- SAPH 8100 - Seminar (1.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8235 - Pharmaceutical Economics and Policy (3.0 cr)
- SAPH 8420 - Social and Behavioral Aspects of Pharmacy Practice (3.0 cr)
- SAPH 8500 - Pharmacy and Its Environment (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)

Statistics Requirement (6 - 8 credits)
Take at least 2 of the following courses or equivalent statistics courses selected in consultation with the advisor.

Take 6 - 8 credit(s) from the following:
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

Electives (6 credits)
Take 6 or more credit(s) from the following:
- SAPH 8054 - Advanced Studies in Pharmaceutical Care Practice (3.0 cr)
- SAPH 8200 - Research Problems (1.0 - 8.0 cr)
- SAPH 8255 - Pharmaceutical Marketing (3.0 cr)
- SAPH 8610 - Pharmacoeconomics (3.0 cr)
- SAPH 8700 - Hospital Pharmacy Administration (3.0 cr)
- SAPH 8702 - Hospital Pharmacy Survey (1.0 cr)
- SAPH 8810 - Social Psychology of Health Care (3.0 cr)
- SAPH 8840 - Social Measurement (3.0 cr)

Outside Coursework (12 credits)
Take at least 12 credits outside the major, selected in consultation with the advisor.

Thesis Credits
Take at least 24 doctoral thesis credits.

- SAPH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Aerospace Engineering and Mechanics M.S.
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@umn.edu
Website: https://cse.umn.edu/aem

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in Aerospace Engineering and Mechanics emphasizes engineering sciences basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A four-year BS degree in an engineering, basic science, or mathematics program is required.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's undergraduate record and letters of recommendation.

Special Application Requirements:
Students are admitted fall semester only, with exceptions made only in unusual circumstances.

The application deadline to be considered for financial aid is December 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.
Plan B: Plan B requires 14 to 24 major credits and 6 to 16 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project (AEM 8880; 3 credits) is completed in consultation with the advisor. The project and its results are the topic of the final oral examination.

Plan C: Plan C requires 14 to 24 major credits and 6 to 16 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Students can apply a maximum of eight 4000-level course credits to degree requirements.

A maximum of four seminar credits with no more than two from AEM 8000 can be applied to degree requirements.

Plan A students can apply a maximum of six credits, and Plan B and Plan C students a maximum of eight credits, of S/N-graded coursework toward degree requirements.

Required Seminar (2 credits)
Take 2 credits of the following in consultation with the advisor:

- **AEM 8000** - Seminar: Aerospace Engineering and Mechanics (1.0 cr)

Major Coursework (9 to 22 credits)
Plan A and Plan C students select at least 12 credits, and Plan B students select at least 9 credits from the following in consultation with the advisor:

- **AEM 4305** - Spacecraft Attitude Dynamics and Control (3.0 cr)
- **AEM 4321** - Automatic Control Systems (3.0 cr)
- **AEM 5247** - Hypersonic Aerodynamics (3.0 cr)
- **AEM 5253** - Computational Fluid Mechanics (3.0 cr)
- **AEM 5321** - Modern Feedback Control (3.0 cr)
- **AEM 5333** - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
- **AEM 5401** - Intermediate Dynamics (3.0 cr)
- **AEM 5451** - Optimal Estimation (3.0 cr)
- **AEM 5501** - Continuum Mechanics (3.0 cr)
- **AEM 5503** - Theory of Elasticity (3.0 cr)
- **AEM 5581** - Mechanics of Solids (3.0 cr)
- **AEM 5651** - Aeroelasticity (3.0 cr)
- **AEM 8201** - Fluid Mechanics I (3.0 cr)
- **AEM 8202** - Fluid Mechanics II (3.0 cr)
- **AEM 8203** - Fluid Mechanics III (3.0 cr)
- **AEM 8207** - Hydrodynamic Stability (3.0 cr)
- **AEM 8211** - Theory of Turbulence I (3.0 cr)
- **AEM 8212** - Theory of Turbulence II (3.0 cr)
- **AEM 8213** - Turbulent Shear Flows (3.0 cr)
- **AEM 8221** - Rheological Fluid Mechanics (3.0 cr)
- **AEM 8231** - Molecular Gas Dynamics (3.0 cr)
- **AEM 8232** - Physical Gas Dynamics and Molecular Simulation (3.0 cr)
- **AEM 8241** - Perturbation Methods in Fluid Mechanics (3.0 cr)
- **AEM 8251** - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- **AEM 8253** - Computational Methods in Fluid Mechanics (3.0 cr)
- **AEM 8261** - Nonlinear Waves in Mechanics (3.0 cr)
- **AEM 8271** - Experimental Methods in Fluid Mechanics (3.0 cr)
- **AEM 8400** - Seminar: Aerospace Systems (1.0 cr)
- **AEM 8411** - Advanced Dynamics (3.0 cr)
- **AEM 8421** - Robust Multivariable Control Design (3.0 cr)
- **AEM 8423** - Convex Optimization Methods in Control (3.0 cr)
- **AEM 8426** - Optimization and System Sciences (3.0 cr)
- **AEM 8442** - Aerospace Positioning, Navigation and Timing (3.0 cr)
- **AEM 8451** - System Identification: Theory and Applications (3.0 cr)
- **AEM 8453** - Model Reduction and Approximation of Dynamical Systems (3.0 cr)
AEM 8500 - Research Seminar in Mechanics of Materials (1.0 cr)
AEM 8523 - Elastodynamics (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8527 - Pattern Formation and Bifurcation in Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)

Outside Coursework (6 to 16 credits)
Plan A students select at 6 credits to complete the 20 course credits required. Plan B and C students select 6 to 16 credits as needed to complete the 30-credit minimum. Courses are selected in consultation with the advisor.

BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
MATH 4242 - Applied Linear Algebra (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8431 - Mathematical Fluid Mechanics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8446 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8361 - Molecular Gas Dynamics (3.0 cr)
ME 8446 - Advanced Combustion (3.0 cr)

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
AEM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Project Credits (3 credits)
Take 3 credits of the following in consultation with the advisor:
AEM 8880 - Plan B Project (1.0 - 3.0 cr)
Twin Cities Campus
Aerospace Engineering and Mechanics Minor
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@umn.edu
Website: https://cse.umn.edu/aem

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program emphasizes engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Aerospace Engineering and Mechanics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken under the AEM course designator to be counted towards a minor.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Coursework (6 to 12 credits)
Master’s students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Aerospace Engineering and Mechanics director of graduate studies. Other courses can be applied to the minor with approval by the Aerospace Engineering and Mechanics director of graduate studies.

- AEM 5247 - Hypersonic Aerodynamics (3.0 cr)
- AEM 5253 - Computational Fluid Mechanics (3.0 cr)
- AEM 5321 - Modern Feedback Control (3.0 cr)
- AEM 5333 - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 5651 - Aeroelasticity (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8203 - Fluid Mechanics III (3.0 cr)
AEM 8207 - Hydrodynamic Stability (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8212 - Theory of Turbulence II (3.0 cr)
AEM 8213 - Turbulent Shear Flows (3.0 cr)
AEM 8221 - Rheological Fluid Mechanics (3.0 cr)
AEM 8231 - Molecular Gas Dynamics (3.0 cr)
AEM 8232 - Physical Gas Dynamics and Molecular Simulation (3.0 cr)
AEM 8241 - Perturbation Methods in Fluid Mechanics (3.0 cr)
AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)
AEM 8261 - Nonlinear Waves in Mechanics (3.0 cr)
AEM 8271 - Experimental Methods in Fluid Mechanics (3.0 cr)
AEM 8411 - Advanced Dynamics (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8426 - Optimization and System Sciences (3.0 cr)
AEM 8442 - Aerospace Positioning, Navigation and Timing (3.0 cr)
AEM 8451 - System Identification: Theory and Applications (3.0 cr)
AEM 8453 - Model Reduction and Approximation of Dynamical Systems (3.0 cr)
AEM 8523 - Elastodynamics (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8527 - Pattern Formation and Bifurcation in Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Aerospace Engineering and Mechanics Ph.D.
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@umn.edu
Website: https://cse.umn.edu/aem

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers a PhD degree program which emphasizes engineering sciences basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A four-year BS degree in an engineering, basic science, or mathematics program is required.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's undergraduate record, personal statement, and letters of recommendation.

Special Application Requirements:
Students are admitted fall semester only, with exceptions made only in unusual circumstances.

The application deadline to be considered for financial aid via the department is December 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 to 30 credits are required in the major.
12 to 30 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Students can apply a maximum of eight 4000-level course credits and 13 S/N-graded course credits to degree requirements.

A maximum of 6 semester credits, with no more than four from AEM 8000, can be applied to degree requirements.

Required Courses (4 credits)

Take 4 credits of the following in consultation with the advisor:

AEM 8000 - Seminar: Aerospace Engineering and Mechanics (1.0 cr)

Major Coursework (8 to 26 credits)

Select at least 8 credits in consultation with the advisor to meet the 12-credit minimum for the major field. Additional credits can be applied to the major with advisor approval.

AEM 4305 - Spacecraft Attitude Dynamics and Control (3.0 cr)
AEM 4321 - Automatic Control Systems (3.0 cr)
AEM 5247 - Hypersonic Aerodynamics (3.0 cr)
AEM 5253 - Computational Fluid Mechanics (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5333 - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 5651 - Aeroelasticity (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8203 - Fluid Mechanics III (3.0 cr)
AEM 8207 - Hydrodynamic Stability (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8212 - Theory of Turbulence II (3.0 cr)
AEM 8213 - Turbulent Shear Flows (3.0 cr)
AEM 8221 - Rheological Fluid Mechanics (3.0 cr)
AEM 8231 - Molecular Gas Dynamics (3.0 cr)
AEM 8232 - Physical Gas Dynamics and Molecular Simulation (3.0 cr)
AEM 8241 - Perturbation Methods in Fluid Mechanics (3.0 cr)
AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)
AEM 8261 - Nonlinear Waves in Mechanics (3.0 cr)
AEM 8271 - Experimental Methods in Fluid Mechanics (3.0 cr)
AEM 8400 - Seminar: Aerospace Systems (1.0 cr)
AEM 8411 - Advanced Dynamics (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8426 - Optimization and System Sciences (3.0 cr)
AEM 8442 - Aerospace Positioning, Navigation and Timing (3.0 cr)
AEM 8451 - System Identification: Theory and Applications (3.0 cr)
AEM 8453 - Model Reduction and Approximation of Dynamical Systems (3.0 cr)
AEM 8500 - Research Seminar in Mechanics of Materials (1.0 cr)
AEM 8523 - Elastodynamics (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8527 - Pattern Formation and Bifurcation in Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
Outside Coursework (12 to 30 credits)
Select credits from the following in consultation with the advisor to meet the 12-credit minimum, and additional credits as needed to complete the 42 course credits required. Other courses may be chosen with advisor approval.

BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CEGE 5401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
MATH 4242 - Applied Linear Algebra (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8431 - Mathematical Fluid Mechanics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8446 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8361 - Molecular Gas Dynamics (3.0 cr)
ME 8446 - Advanced Combustion (3.0 cr)

Thesis Credits (24 credits)
Take 24 doctoral thesis credits after passing preliminary oral exam.
AEM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Astrophysics M.S.
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 130 Tate Hall, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: MIfA@umn.edu
Website: https://cse.umn.edu/mifa

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Astrophysics graduate program does not accept applications directly to the MS; rather, the MS is an additional or alternative credential for students admitted to the Astrophysics PhD program.

Astrophysics is the study of the universe and its constituent parts. The Minnesota Institute for Astrophysics conducts research in observational, theoretical, and computational astrophysics, as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
The Astrophysics graduate program does not accept applications directly to the MS; rather, the MS is an additional or alternative credential for students admitted to the Astrophysics PhD program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 to 24 major credits and 6 to 16 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: The Plan B project comprises one to three papers written in connection with three program courses in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.
Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of C earned for each course.

Approval by the advisor and director of graduate studies is required for use of 4000-level courses (with a maximum of 9 units at the 4000 level). Courses taken without prior approval by the advisor and director of graduate studies may not count toward the degree.

Required Courses (8 credits)
Take the following courses:
PHYS 5011 - Classical Physics I (4.0 cr)
PHYS 5012 - Classical Physics II (4.0 cr)

Electives (6 to 16 credits)
Plan A students select 6 credits, and Plan B students select 6 to 16 credits from the following in consultation with the advisor:
AST 4001 - Astrophysics I (4.0 cr)
AST 4002 - Astrophysics II (4.0 cr)
AST 4031 - Interpretation and Analysis of Astrophysical Data (4.0 cr)
AST 4041 - Computational Methods in the Physical Sciences (4.0 cr)
AST 5012 - The Interstellar Medium (4.0 cr)
AST 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
AST 5201 - Methods of Experimental Astrophysics (4.0 cr)
AST 8001 - Radiative Processes in Astrophysics (4.0 cr)
AST 8011 - High Energy Astrophysics (4.0 cr)
AST 8031 - Astrophysical Fluid Dynamics (4.0 cr)
AST 8110 - Topics in Astrophysics (4.0 cr)
AST 8120 - Topics in Astrophysics (4.0 cr)
AST 8200 - Astrophysics Seminar (1.0 - 3.0 cr)
AST 8990 - Research in Astronomy and Astrophysics (1.0 - 4.0 cr)

Outside Coursework (6-16 credits)
Plan A students select 6 credits, and Plan B students select 6 to 16 credits from the following in consultation with the advisor. Other courses can be chosen with advisor and director of graduate studies approval.
AEM 5501 - Continuum Mechanics (3.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 8011 - Quantum Field Theory I (3.0 cr)
PHYS 8012 - Quantum Field Theory II (3.0 cr)
PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
PHYS 8601 - Plasma Physics I (3.0 cr)
PHYS 8602 - Plasma Physics II (3.0 cr)
PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
PHYS 8801 - Nuclear Physics I (3.0 cr)
PHYS 8802 - Nuclear Physics II (3.0 cr)

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
AST 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Astrophysics Minor
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 130 Tate Hall, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: MIfA@umn.edu
Website: https://cse.umn.edu/mifa

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The Minnesota Institute for Astrophysics conducts research in observational, theoretical, and computational astrophysics, as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Astrophysics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of C earned for each course.

Approval by the advisor and director of graduate studies is required for use of 4000-level courses (with a maximum of 9 units at the 4000 level). Courses taken without prior approval by the advisor and director of graduate studies may not count toward the degree.

The minimum cumulative GPA for the minor is 3.00.

Coursework Requirements 8-12 credits)
Master's students select a minimum of 8 credits, and doctoral students select a minimum of 12 credits in consultation with the Astrophysics director of graduate studies.

AST 4001 - Astrophysics I (4.0 cr)
AST 4002 - Astrophysics II (4.0 cr)
AST 4031 - Interpretation and Analysis of Astrophysical Data (4.0 cr)
AST 4041 - Computational Methods in the Physical Sciences (4.0 cr)
AST 5012 - The Interstellar Medium (4.0 cr)
AST 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
AST 5201 - Methods of Experimental Astrophysics (4.0 cr)
AST 8001 - Radiative Processes in Astrophysics (4.0 cr)
AST 8011 - High Energy Astrophysics (4.0 cr)
AST 8031 - Astrophysical Fluid Dynamics (4.0 cr)
AST 8110 - Topics in Astrophysics (4.0 cr)
AST 8120 - Topics in Astrophysics (4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Astrophysics Ph.D.
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 130 Tate Hall, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: MIfA@umn.edu
Website: https://cse.umn.edu/mifa

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The Minnesota Institute for Astrophysics conducts research in observational, theoretical, and computational astrophysics, as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

An undergraduate astronomy, physics or equivalent degree is required.

Other requirements to be completed before admission:
Coursework in analytical mechanics, electrodynamics, quantum mechanics, thermodynamics, and statistical physics.

Special Application Requirements:
A statement of career goals, diversity statement, scores from the GRE General Test (required) and Subject Test in physics (optional), and three letters of recommendation. Applications are due by December 15 to be considered for fellowships and by January 15 for teaching and research assistantships. Students are admitted fall semester only.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of C earned for each course.

Approval by the advisor and director of graduate studies is required for use of 4000-level courses (with a maximum of 9 units at the 4000 level). Courses taken without prior approval by the advisor and director of graduate studies may not count toward the degree.

Required Courses (8 credits)
Take the following courses:
- PHYS 5011 - Classical Physics I (4.0 cr)
- PHYS 5012 - Classical Physics II (4.0 cr)

Electives (20 credits)
Select 20 credits from the following in consultation with the advisor:
- AST 4001 - Astrophysics I (4.0 cr)
- AST 4002 - Astrophysics II (4.0 cr)
- AST 4031 - Interpretation and Analysis of Astrophysical Data (4.0 cr)
- AST 4041 - Computational Methods in the Physical Sciences (4.0 cr)
- AST 5012 - The Interstellar Medium (4.0 cr)
- AST 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
- AST 5201 - Methods of Experimental Astrophysics (4.0 cr)
- AST 5001 - Radiative Processes in Astrophysics (4.0 cr)
- AST 8011 - High Energy Astrophysics (4.0 cr)
- AST 8031 - Astrophysical Fluid Dynamics (4.0 cr)
- AST 8110 - Topics in Astrophysics (4.0 cr)
- AST 8120 - Topics in Astrophysics (4.0 cr)
- AST 8200 - Astrophysics Seminar (1.0 - 3.0 cr)
- AST 8990 - Research in Astronomy and Astrophysics (1.0 - 4.0 cr)

Outside Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
- AEM 5501 - Continuum Mechanics (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
- PHYS 5001 - Quantum Mechanics I (4.0 cr)
- PHYS 5002 - Quantum Mechanics II (4.0 cr)
- PHYS 8011 - Quantum Field Theory I (3.0 cr)
- PHYS 8012 - Quantum Field Theory II (3.0 cr)
- PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
- PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
- PHYS 8601 - Plasma Physics I (3.0 cr)
- PHYS 8602 - Plasma Physics II (3.0 cr)
- PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
- PHYS 8801 - Nuclear Physics I (3.0 cr)
- PHYS 8802 - Nuclear Physics II (3.0 cr)
Thesis Credits (24 credits)
Take 24 doctoral thesis credits after passing preliminary oral exam.
AST 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Bioinformatics and Computational Biology M S
R Bioscience/Biotechnology
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Bioinformatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: biecgrad@umn.edu
Website: https://r.umn.edu/academics-research/graduate/bicb

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- The Bioinformatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Bioinformatics and Computational Biology Program.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Bioinformatics and Computational Biology (BICB) program offers a curriculum individualized to fit the student's interests, research direction, and professional goals. Students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Those interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences.

The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

Other requirements to be completed before admission:
In addition to completing the online application form, applicants must submit 1) a personal statement, normally 2 to 3 pages, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in bioinformatics and computational biology; and 2) a diversity statement that describes past experiences and future plans that would enable the applicant to contribute to the diversity of the graduate program and the University. Applicants should also indicate names of the BICB graduate faculty whose interests overlap their own.

Special Application Requirements:
Applications are accepted throughout the year for fall, spring, or summer. Three letters of recommendation and scores from the General Test of the GRE are required. GRE scores may be waived for students with significant work or academic experience.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B students complete an experiential project under the direction of a faculty member. One to three written reports or projects, totaling approximately 120 hours of independent work, are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Approval by the director of graduate studies is required for use of 4xxx courses. A maximum of one 4xxx-level course of 4 credits or less may be applied to degree requirements.

Required Coursework (7 credits)

Major Courses (6 credits)
Take the following courses. Take BICB 8930 twice for 2 credits.

- BICB 8510 - Computation and Biology (2.0 cr) [A-F] (Rochester campus)
- BICB 8920 - BICB Colloquium (1.0 cr) (Rochester campus)
- BICB 8930 - BICB Journal Club (1.0 cr) (Rochester campus)
- BICB 8970 - Entrepreneurship and Leadership Seminar (1.0 cr) (Rochester campus)

Ethics Course (1 credit)
Select one of the following in consultation with the adviser:

- BICB 8401 - Ethics in Bioinformatics and Computational Biology (1 cr) [SNV] (Rochester campus)
- BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
- BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
- BIOC 5351 - Protein Engineering (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5444 - Muscle (3.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)

Core Courses (9 credits)
Select a minimum of one course from each of the three core areas. A total of 9 credits is required. Other courses may be applied to this requirement with director of graduate studies approval.

Biochemistry, Genetics, Molecular Cell Biology and Physiology
Select at least one course from the following in consultation with the advisor:

- AGRO 5021 - Plant Breeding Principles (3.0 cr)
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
- BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
- BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
- BIOC 5351 - Protein Engineering (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5444 - Muscle (3.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
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<td>BMEN 5501</td>
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<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics</td>
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<td>EEB 5042</td>
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<td>GCD 4151</td>
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<td>Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death</td>
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<td>PHSO 5211</td>
<td>Physiology of Inflammation in Disease</td>
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<td>PHSO 5444</td>
<td>Muscle</td>
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<td>PHSO 5510</td>
<td>Advanced Cardiac Physiology and Anatomy</td>
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<td>Anatomy and Physiology of the Pelvis and Urinary System</td>
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<td>Principles of Toxicology II</td>
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<tr>
<td>PUBH 6182</td>
<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies</td>
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<td>Fundamentals of Epidemiology</td>
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<td>PUBH 6361</td>
<td>Genetics in Public Health in the Age of Precision Medicine</td>
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<td>PUBH 7470</td>
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<td>VMED 5180</td>
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**Mathematics, Biostatistics and Statistics**

Select at least one course from the following in consultation with the advisor:

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<tr>
<th>Course Code</th>
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<th>Credit Hours</th>
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<td>CSCI 5304</td>
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<td>EE 8231</td>
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<td>Dynamical Systems and Chaos</td>
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<td>Graph Theory and Non-enumerative Combinatorics</td>
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<td>Linear Programming and Combinatorial Optimization</td>
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<td>Epidemiology and Control of Infectious Diseases</td>
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<td>Cardiovascular Disease Epidemiology and Prevention</td>
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<td>Cancer Epidemiology</td>
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<td>Clinical Trials: Design, Implementation, and Analysis</td>
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<td>Introduction to Bayesian Analysis</td>
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**Computer Science, Informatics, Computational Biology and System Biology**

Select at least one course from the following in consultation with the advisor:

- BMEN 4013 - CAD of Biomechanical/transport Devices (1.0 cr)
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
- CSCI 4041 - Algorithms and Data Structures (4.0 cr)
- CSCI 5066 - Programming Languages (3.0 cr)
- CSCI 5111 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5161 - Introduction to Compilers (3.0 cr)
- CSCI 5204 - Advanced Computer Architecture (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5522 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
Electives

Plan A students select credits to complete the 20 course credits required, and Plan B students select credits to meet the 30-credit minimum. Courses are selected in consultation with the advisor. Courses other than those listed below can be chosen with director of graduate studies approval.

AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5121 - Applied Experimental Design (4.0 cr)
AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
BICB 5620 Topics in BICB 0.50 - 4.00 credits [OPT] (Rochester campus)
BICB 8620 Topics in BICB 0.50 - 4.00 credits [OPT] (Rochester campus)
BICB 8670 Topics in Management 0.50 - 4.0 credits [OPT] (Rochester campus)
BICB 8932 - Proposal Writing Seminar (1 cr) (Rochester campus)
BICB 8940 Education and Pedagogy Seminar - 1 credit [S-N] (Rochester campus)
BICB 8960 Internship I - 1 - 6 credits [S-N] (Rochester campus)
BICB 8990 Seminar on Special Topics - 1 credit [OPT] (Rochester campus)
BICB 8991 Independent Study - 1 - 2 credits [S-N] (Rochester campus)
BICB 8994 Directed Research I - 1 - 3 credits [S-N] (Rochester campus)
BIOC 5002 - Critical Evaluation of Biochemistry Research (1.0 cr)
BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5444 - Muscle (3.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
BIOC 8084 - Research and Literature Reports (1.0 cr)
BIOC 8102 - Hot Topics in the Biology of Aging (1.0 cr)
BIOC 8184 - Graduate Seminar (1.0 cr)
BIOL 4003 - Genetics (3.0 cr)
BIOL 5272 - Applied Biostatistics (4.0 cr)
BIOL 5950 - Special Topics (1.0 - 4.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
BMEN 4013 - CAD of Biomechanical/transport Devices (1.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5041 - Tissue Engineering (3.0 cr)
BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
BMEN 5111 - Biomedical Ultrasound (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5411 - Neural Engineering (3.0 cr)
BMEN 5412 - Neuromodulation (3.0 cr)
BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CMB 5912 - Creativity (1.0 cr)
CMB 8208 - Neuropsychopharmacology (3.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5161 - Introduction to Compilers (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5583 - Complex Analysis (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5707 - Graph Theory and Non-Enumerative Combinatorics (4.0 cr)
MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8584 - Theory of Partial Differential Equations (3.0 cr)
MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)
MCDG 8920 - Special Topics (1.0 - 4.0 cr)
MCDG 8950 - Teaching Practicum (1.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8413 - Chemistry of Nucleic Acids (4.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 5000 - Practicum: Teaching (0.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8005 - Topics in Microbiology, Immunology, and Cancer Biology (1.0 - 4.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MICA 8011 - Current Topics in Immunology (3.0 cr)
MICA 8012 - Writing and Reviewing a Research Proposal (2.0 cr)
MICA 8013 - Translational Cancer Research (2.0 cr)
MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)
MICA 8910 - Seminar: Faculty Research Topics (0.0 cr)
MICA 8920 - Seminar: Student Research Topics (0.0 cr)
MICE 5035 - Personal Microbiome Analysis (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6451 - Optimization and Simulation for Decision Making (3.0 cr)
NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
NSC 5661 - Behavioral Neuroscience (3.0 cr)
NSC 8026 - Neuro-Immune Interactions (3.0 cr)
NSC 8111 - Quantitative Neurosciences (3.0 cr)
NSC 8211 - Developmental Neurobiology (4.0 cr)
NSC 8320 - Readings in Neurobiology (1.0 - 4.0 cr)
NSC 8481 - Advanced Neuropharmaceuticals (4.0 cr)
PHAR 5201 - Applied Medical Terminology (2.0 cr)
PHAR 5700 - Applied Fundamentals of Pharmacotherapy (3.0 cr)
PHCL 5109 - Introduction to Scientific Communication (1.0 - 18.0 cr)
PHCL 5110 - Introduction to Pharmacology (3.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHCL 5462 - Neuroscience Principles of Drug Abuse (2.0 cr)
PHCL 8014 - Small RNA Biology (2.0 cr)
PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
PHSL 5101 - Human Physiology (5.0 cr)
PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
PHSL 5444 - Muscle (3.0 cr)
PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
PHSL 6051 - Systems Physiology (4.0 cr)
PHSL 8232 - Critical Reading of Journal Articles in Physiology (2.0 cr)
PHSL 8294 - Research in Physiology (1.0 - 18.0 cr)
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Plan Options

Plan A
Take 10 master's thesis credits
BICB 8777 - Thesis Credit: Masters (Rochester Campus)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Bioinformatics and Computational Biology Minor
R Bioscience/Biotechnology
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Bioinformatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: https://r.umn.edu/academics-research/graduate/bicb

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- The Bioinformatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Bioinformatics and Computational Biology Program.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Bioinformatics and Computational Biology (BICB) minor curriculum is individualized to fit the student's interest, research direction, and professional goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Bioinformatics and Computational Biology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minimum cumulative GPA for the minor is 3.00.

Approval by the director of graduate studies is required for use of 4xxx courses. A maximum of one 4xxx-level course of 4 credits or less may be applied to degree requirements.

Core Courses (6 credits)
Select one course from at least two of the core areas for a total of 6 credits. Courses are chosen in consultation with the BICB director of graduate studies. Other courses may be applied to this requirement with director of graduate studies approval.

Biochemistry, Genetics, Molecular Cell Biology and Physiology
AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5121 - Applied Experimental Design (4.0 cr)
AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)

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Information current as of November 07, 2022
NSC 5661 - Behavioral Neuroscience (3.0 cr)
NSC 8026 - Neuro-Immune Interactions (3.0 cr)
NSC 8111 - Quantitative Neuroscience (3.0 cr)
NSC 8211 - Developmental Neurobiology (4.0 cr)
NSC 8481 - Advanced Neuropharmaceutics (4.0 cr)
PHAR 5201 - Applied Medical Terminology (2.0 cr)
PHAR 5700 - Applied Fundamentals of Pharmacotherapy (3.0 cr)
PHCL 5109 - Introduction to Scientific Communication (1.0 - 18.0 cr)
PHCL 5110 - Introduction to Pharmacology (3.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHCL 5462 - Neuroscience Principles of Drug Abuse (2.0 cr)
PHCL 8014 - Small RNA Biology (2.0 cr)
PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
PHSL 5101 - Human Physiology (5.0 cr)
PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
PHSL 5444 - Muscle (3.0 cr)
PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
PHSL 6051 - Systems Physiology (4.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PSY 8026 - Neuro-Immune Interactions (3.0 cr)
PUBH 6159 - Principles of Toxicology I (2.0 cr)
PUBH 6160 - Principles of Toxicology II (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 8160 - Advanced Toxicology (2.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5240 - Advanced Small Animal Pathobiology I (1.0 cr)
VMED 5243 - Advanced Small Animal Pathobiology IV (1.0 cr)

**Mathematics, Biostatistics and Statistics**

BIOL 5272 - Applied Biostatistics (4.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
IE 8521 - Optimization (4.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5385 - Introduction to Computational Algebraic Geometry (4.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5583 - Complex Analysis (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5707 - Graph Theory and Non-Enumerative Combinatorics (4.0 cr)
MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8584 - Theory of Partial Differential Equations (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6451 - Optimization and Simulation for Decision Making (3.0 cr)
PUBH 6310 - Clinical Epidemiology I (1.0 cr)
PUBH 6311 - Clinical Epidemiology II (1.0 cr)

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Information current as of November 07, 2022

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**Computer Science, Informatics, Computational Biology and System Biology**

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CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
EE 4389W - Introduction to Predictive Learning [WI] (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5340 - Introduction to Quantum Computing and Physical Basics of Computing (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
GCD 5005 - Computer Programming for Biology (3.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
HINF 8220 - Computational Causal Analytics (3.0 cr)
HINF 8430 - Foundations of Health Informatics I Lab (2.0 cr)
HINF 8440 - Foundations of Translational Bioinformatics Lab (2.0 cr)
MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
SENG 5831 - Software Development for Real-Time Systems (2.0 - 3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

**Elective Courses**

Masters students select courses to complete the 9-credit minimum, and doctoral students select courses to complete the 12-credit minimum in consultation with BICB director of graduate studies. Other courses can be chosen with approval by the BICB director of graduate studies.

**AGRO 5021** - Plant Breeding Principles (3.0 cr)
**AGRO 5121** - Applied Experimental Design (4.0 cr)
**AGRO 5311** - Research Methods in Crop Improvement and Production (1.0 cr)
**BICB 5620** - Topics in Biomedical Informatics and Computational Biology (0.5-4.0 cr) [OPT]
**BICB 8401** - Ethics in Bioinformatics and Computational Biology (1.0 cr)[OPT]
**BICB 8510** - Computation and Biology (2.0 cr) [A-F]
**BICB 8620** - Topics in Biomedical Informatics and Computational Biology (0.5-4.0 cr) [OPT]
**BICB 8670** - Topics in Management of Technology (0.5-4.0 cr) [OPT]
**BICB 8920** - BICB Colloquium (1.0 cr) [S-N]
**BICB 8930** - BICB Journal Club (1.0 cr) [S-N]
**BICB 8932** - Proposal Writing Seminar (1.0 cr) [S-N]
**BICB 8940** - Education and Pedagogy Seminar (1.0 cr) [S-N]
**BICB 8970** - Entrepreneurship and Leadership Seminar (1.0 cr) [S-N]
**BICB 8990** - Seminar on Current Topics (1.0 cr) [OPT]
**BICB 8991** - Independent Study (1.0-2.0 cr) [S-N]

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Information current as of November 07, 2022
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CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
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CSCI 5609 - Visualization (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8970 - Computer Science Colloquium (1.0 cr)
CSCI 8991 - Independent Study (1.0 - 3.0 cr)
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
DSCI 8970 - Data Science M.S. Colloquium (1.0 cr)
ECP 5220 - Regulatory Issues in Drug Research (2.0 cr)
ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
ECP 8230 - Principles of Clinical Pharmacology (2.0 cr)
ECP 8500 - Advances in Pharmacometrics Modeling and Simulation (1.0 cr)
ECP 8503 - Intermediate Population PK/PD Methods (2.0 cr)
EE 4399W - Introduction to Predictive Learning [WI] (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5340 - Introduction to Quantum Computing and Physical Basics of Computing (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5616 - Antenna Theory and Design (3.0 cr)
EE 5811 - Biological Instrumentation (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCD 4151 - Molecular Biology of Cancer (3.0 cr)
GCD 5005 - Computer Programming for Biology (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8103 - Human Histology (5.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
GCD 8171 - Literature Analysis (1.0 - 2.0 cr)
GCD 8520 - Special Topics (1.0 - 4.0 cr)
GRD 4999 - Graduate Summer Research (0.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
HINF 8220 - Computational Causal Analytics (3.0 cr)
HINF 8430 - Foundations of Health Informatics I Lab (2.0 cr)
HINF 8440 - Foundations of Translational Bioinformatics Lab (2.0 cr)
HINF 8492 - Advanced Readings or Research in Health Informatics (1.0 - 6.0 cr)
HINF 8494 - Research in Health Informatics (1.0 - 6.0 cr)
HINF 8525 - Health Informatics Teaching (2.0 cr)
HORT 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
IE 8521 - Optimization (4.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5385 - Introduction to Computational Algebraic Geometry (4.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5583 - Complex Analysis (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5707 - Graph Theory and Non-Enumerative Combinatorics (4.0 cr)
MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8584 - Theory of Partial Differential Equations (3.0 cr)
MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)
MCDG 8920 - Special Topics (1.0 - 4.0 cr)
MCDG 8950 - Teaching Practicum (1.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8413 - Chemistry of Nucleic Acids (4.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 5000 - Practicum: Teaching (0.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8005 - Topics in Microbiology, Immunology, and Cancer Biology (1.0 - 4.0 cr)
MICA 8011 - Current Topics in Immunology (3.0 cr)
MICA 8012 - Writing and Reviewing a Research Proposal (2.0 cr)
MICA 8013 - Translational Cancer Research (2.0 cr)
MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)
MICA 8910 - Seminar: Faculty Research Topics (0.0 cr)
MICA 8920 - Seminar: Student Research Topics (0.0 cr)
MICE 5035 - Personal Microbiome Analysis (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6451 - Optimization and Simulation for Decision Making (3.0 cr)
NSC 5461 - Cellular and Molecula Neuroscience (3.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
NSC 5661 - Behavioral Neuroscience (3.0 cr)
NSC 8026 - Neuro-Immune Interactions (3.0 cr)
NSC 8111 - Quantitative Neuroscience (3.0 cr)
NSC 8211 - Developmental Neurobiology (4.0 cr)
NSC 8320 - Readings in Neurobiology (1.0 - 4.0 cr)
NSC 8481 - Advanced Neuropharmaceutics (4.0 cr)
PHAR 5201 - Applied Medical Terminology (2.0 cr)
PHAR 5700 - Applied Fundamentals of Pharmacotherapy (3.0 cr)
PHCL 5109 - Introduction to Scientific Communication (1.0 - 18.0 cr)
PHCL 5110 - Introduction to Pharmacology (3.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHCL 5462 - Neuroscience Principles of Drug Abuse (2.0 cr)
PHCL 8014 - Small RNA Biology (2.0 cr)
PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
PHCL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHCL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
PHCL 5101 - Human Physiology (5.0 cr)
PHCL 5197 - Stress Physiology (1.0 - 3.0 cr)
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<td>Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)</td>
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<td>PHSL 5525</td>
<td>Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)</td>
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<td>PHSL 6051</td>
<td>Systems Physiology (4.0 cr)</td>
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<tr>
<td>PHSL 8223</td>
<td>Critical Reading of Journal Articles in Physiology (2.0 cr)</td>
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<tr>
<td>PHSL 8294</td>
<td>Research in Physiology (1.0 - 18.0 cr)</td>
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<tr>
<td>PLPA 5480</td>
<td>Principles of Plant Pathology (3.0 cr)</td>
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<td>PLPA 8104</td>
<td>Plant Virology (2.0 cr)</td>
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<tr>
<td>PMB 8900</td>
<td>Seminar (1.0 cr)</td>
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<tr>
<td>PSY 8026</td>
<td>Neuro-Immune Interactions (3.0 cr)</td>
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<tr>
<td>PUBH 6159</td>
<td>Principles of Toxicology I (2.0 cr)</td>
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<tr>
<td>PUBH 6160</td>
<td>Principles of Toxicology II (3.0 cr)</td>
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<tr>
<td>PUBH 6182</td>
<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)</td>
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<tr>
<td>PUBH 6310</td>
<td>Clinical Epidemiology I (1.0 cr)</td>
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<tr>
<td>PUBH 6311</td>
<td>Clinical Epidemiology II (1.0 cr)</td>
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<tr>
<td>PUBH 6320</td>
<td>Fundamentals of Epidemiology (3.0 cr)</td>
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<tr>
<td>PUBH 6325</td>
<td>Data Processing with PC-SAS (1.0 cr)</td>
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<tr>
<td>PUBH 6341</td>
<td>Epidemiologic Methods I (3.0 cr)</td>
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<td>PUBH 6342</td>
<td>Epidemiologic Methods II (3.0 cr)</td>
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<tr>
<td>PUBH 6343</td>
<td>Epidemiologic Methods III (4.0 cr)</td>
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<tr>
<td>PUBH 6366</td>
<td>Modeling and Mapping for Infectious Disease Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6381</td>
<td>Genetics in Public Health in the Age of Precision Medicine (2.0 cr)</td>
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<tr>
<td>PUBH 6385</td>
<td>Epidemiology and Control of Infectious Diseases (2.0 cr)</td>
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<tr>
<td>PUBH 6386</td>
<td>Cardiovascular Disease Epidemiology and Prevention (2.0 cr)</td>
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<tr>
<td>PUBH 6387</td>
<td>Cancer Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6414</td>
<td>Biostatistical Literacy (3.0 cr)</td>
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<tr>
<td>PUBH 6420</td>
<td>Introduction to SAS Programming (1.0 cr)</td>
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<tr>
<td>PUBH 6450</td>
<td>Biostatistics I (4.0 cr)</td>
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<tr>
<td>PUBH 6451</td>
<td>Biostatistics II (4.0 cr)</td>
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<tr>
<td>PUBH 6541</td>
<td>Statistics for Health Management Decision Making (3.0 cr)</td>
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<tr>
<td>PUBH 6717</td>
<td>Decision Analysis for Health Care (2.0 cr)</td>
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<tr>
<td>PUBH 6813</td>
<td>Managing Electronic Health Information (2.0 cr)</td>
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<tr>
<td>PUBH 7401</td>
<td>Fundamentals of Biostatistical Inference (4.0 cr)</td>
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<tr>
<td>PUBH 7402</td>
<td>Biostatistics Modeling and Methods (4.0 cr)</td>
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<tr>
<td>PUBH 7405</td>
<td>Biostatistical Inference I (4.0 cr)</td>
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<td>PUBH 7406</td>
<td>Biostatistical Inference II (3.0 cr)</td>
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<tr>
<td>PUBH 7415</td>
<td>Introduction to Clinical Trials (3.0 cr)</td>
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<tr>
<td>PUBH 7420</td>
<td>Clinical Trials: Design, Implementation, and Analysis (3.0 cr)</td>
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<td>PUBH 7430</td>
<td>Statistical Methods for Correlated Data (3.0 cr)</td>
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<td>PUBH 7440</td>
<td>Introduction to Bayesian Analysis (3.0 cr)</td>
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<tr>
<td>PUBH 7445</td>
<td>Statistics for Human Genetics and Molecular Biology (3.0 cr)</td>
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<tr>
<td>PUBH 7461</td>
<td>Exploring and Visualizing Data in R (2.0 cr)</td>
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<tr>
<td>PUBH 7462</td>
<td>Advanced Programming and Data Analysis in R (2.0 cr)</td>
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<tr>
<td>PUBH 7470</td>
<td>Study Designs in Biomedical Research (3.0 cr)</td>
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<tr>
<td>PUBH 7475</td>
<td>Statistical Learning and Data Mining (3.0 cr)</td>
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<tr>
<td>PUBH 8160</td>
<td>Advanced Toxicology (2.0 cr)</td>
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<tr>
<td>PUBH 8401</td>
<td>Linear Models (3.0 cr)</td>
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<tr>
<td>PUBH 8432</td>
<td>Probability Models for Biostatistics (3.0 cr)</td>
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<tr>
<td>PUBH 8442</td>
<td>Bayesian Decision Theory and Data Analysis (3.0 cr)</td>
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<tr>
<td>PUBH 8472</td>
<td>Spatial Biostatistics (3.0 cr)</td>
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<tr>
<td>PUBH 8475</td>
<td>Statistical Learning and Data Mining (3.0 cr)</td>
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<td>SCB 5054</td>
<td>Stem Cell Institute Research Seminar and Journal Club (2.0 cr)</td>
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<tr>
<td>SCB 8181</td>
<td>Stem Cell Biology (3.0 cr)</td>
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<tr>
<td>SCO 8892</td>
<td>Readings in Supply Chain and Operations (1.0 - 8.0 cr)</td>
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<tr>
<td>SCO 8894</td>
<td>Research in Supply Chain and Operations (1.0 - 8.0 cr)</td>
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<tr>
<td>SENG 5199</td>
<td>Topics in Software Engineering (2.0 - 3.0 cr)</td>
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<tr>
<td>SENG 5831</td>
<td>Software Development for Real-Time Systems (2.0 - 3.0 cr)</td>
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<tr>
<td>STAT 5021</td>
<td>Statistical Analysis (4.0 cr)</td>
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<td>STAT 5052</td>
<td>Statistical and Machine Learning (3.0 cr)</td>
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<tr>
<td>STAT 5101</td>
<td>Theory of Statistics I (4.0 cr)</td>
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<tr>
<td>STAT 5102</td>
<td>Theory of Statistics II (4.0 cr)</td>
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<tr>
<td>STAT 5201</td>
<td>Sampling Methodology in Finite Populations (3.0 cr)</td>
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<tr>
<td>STAT 5302</td>
<td>Applied Regression Analysis (4.0 cr)</td>
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<tr>
<td>STAT 5303</td>
<td>Designing Experiments (4.0 cr)</td>
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<tr>
<td>STAT 5401</td>
<td>Applied Multivariate Methods (3.0 cr)</td>
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STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8111 - Mathematical Statistics I (3.0 cr)
STAT 8311 - Linear Models (3.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
VMED 5190 - Effective Science Communication (2.0 cr)
VMED 5243 - Advanced Small Animal Pathobiology IV (1.0 cr)
VMED 5442 - Quantitative Methods for Population Health (3.0 cr)
VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 5930 - Antimicrobial Resistance (AMR) from a One Health Perspective (1.0 cr)
VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Bioinformatics and Computational Biology Ph D
R Bioscience/Biotechnology
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Bioinformatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bibgrad@umn.edu
Website: https://r.umn.edu/academics-research/graduate/bicb

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 55
- This program does not require summer semesters for timely completion.
- The Bioinformatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Bioinformatics and Computational Biology Program.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Bioinformatics and Computational Biology (BICB) program offers a curriculum individualized to fit the student's interests, research direction, and professional goals. Students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. The PhD program includes an industrial or clinical internship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences.

The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

Other requirements to be completed before admission:
In addition to completing the online application form, applicants must submit 1) a personal statement, normally 2 to 3 pages, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in bioinformatics and computational biology; and 2) a diversity statement that describes past experiences and future plans that would enable the applicant to contribute to the diversity of the graduate program and the University. Applicants should also indicate the names of the BICB graduate faculty whose interests overlap with their own. The department strongly encourages applicants to contact these faculty members before applying.

Special Application Requirements:
Applicants are admitted for fall semester only. Applications are accepted from September 15 through January 15. Three letters of recommendation and scores from the General Test of the GRE are required. GRE scores may be waived for students with significant work or academic experience. To receive full consideration for financial support, applications must be submitted no later than December 15.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

- **IELTS**
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

31 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Approval by the director of graduate studies is required for use of 4xxx courses. A maximum of one 4xxx-level course of 4 credits or less may be applied to degree requirements.

Courses used to satisfy the credit requirements in the Core areas of Biochemistry, Genetics, Molecular Cell Biology and Physiology; Mathematics, Biostatistics and Statistics; and Computer Science, Informatics, Computational Biology and System Biology may not be applied to a minor in another program. A maximum of 6 credits in courses used to satisfy Elective requirements can be applied to a minor.

Students must complete an industrial internship in consultation with and approval of the advisor and the director of graduate studies. A minimum of 120 hours work and a final report are required. The timing is flexible. The internship may be waived for students with equivalent experience upon DGS approval. Students who wish to receive credit for the internship may register for BICB 8960.

Required Coursework (13 credits)

**Major Courses (12 credits)**

- Take BICB 8510 twice for 4 credits. Students may have the spring registration requirement waived with director of graduate studies permission for students with advanced research experience when entering the program.

Take 8920 and 8930 three times for 3 credits.

BICB 8932 may be waived with the director of graduate studies permission for students with advanced research experience when entering the program.

BICB 8510 - Computation and Biology (2 cr)[A-F](Rochester campus)
BICB 8920 - BICB Colloquium (1 cr)[SN](Rochester campus)
BICB 8930 - BICB Journal Club (1 cr)[SN](Rochester campus)
BICB 8932 - Proposal Writing Seminar (1 cr)[SN](Rochester campus)
BICB 8970 - Entrepreneurship and Leadership Seminar (1 cr)[SN](Rochester campus)

**Ethics Course (1 credit)**

Select one of the following in consultation with the advisor:

- BICB 8401 - Ethics in Bioinformatics and Computational Biology (1 cr)[SN](Rochester campus)
- BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
- BTHX 5000 - Topics in Bioethics (1.0 - 4.0 cr)
- BTHX 5325 - Biomedical Ethics (3.0 cr)
- BTHX 5900 - Independent Study in Bioethics (1.0 - 4.0 cr)
- GCD 8401 - Ethics, Public Policy & Careers in Molecular Cell Biology (1.0 cr)
- MBA 6315 - The Ethical Environment of Business (2.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Core Courses (9 credits)**

Select a minimum of one course from each of the three core areas. A total of 9 credits is required. Other courses may be applied to this requirement with director of graduate studies approval.
Biochemistry, Genetics, Molecular Cell Biology and Physiology
Select at least one course from the following in consultation with the advisor:

AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5121 - Applied Experimental Design (4.0 cr)
AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5444 - Muscle (3.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
BIOC 8102 - Hot Topics in the Biology of Aging (1.0 cr)
BIOL 4003 - Genetics (3.0 cr)
BIOL 5950 - Special Topics (1.0 - 4.0 cr)
BMEN 5111 - Biomedical Ultrasound (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5411 - Neural Engineering (3.0 cr)
BMEN 5412 - Neuromodulation (3.0 cr)
BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CMB 8208 - Neuropsychopharmacology (3.0 cr)
ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
ECP 8500 - Intermediate Population PK/PD Methods (2.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCD 4151 - Molecular Biology of Cancer (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8103 - Human Histology (5.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
GCD 8920 - Special Topics (1.0 - 4.0 cr)
HORT 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8413 - Chemistry of Nucleic Acids (4.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8005 - Topics in Microbiology, Immunology, and Cancer Biology (1.0 - 4.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MICA 8011 - Current Topics in Immunology (3.0 cr)
MICA 8013 - Translational Cancer Research (2.0 cr)
MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)
MICE 5035 - Personal Microbiome Analysis (3.0 cr)
NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
NSC 5661 - Behavioral Neuroscience (3.0 cr)
NSC 8026 - Neuro-Immune Interactions (3.0 cr)
NSC 8481 - Advanced Neuropharmaceutics (4.0 cr)
PHAR 5201 - Applied Medical Terminology (2.0 cr)
PHAR 5700 - Applied Fundamentals of Pharmacotherapy (3.0 cr)
PHCL 5109 - Introduction to Scientific Communication (1.0 - 18.0 cr)
PHCL 5110 - Introduction to Pharmacoecology (3.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHCL 5462 - Neuroscience Principles of Drug Abuse (2.0 cr)
PHCL 8014 - Small RNA Biology (2.0 cr)
PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
PHSL 5101 - Human Physiology (5.0 cr)
PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
PHSL 5444 - Muscle (3.0 cr)
PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
PHSL 6051 - Systems Physiology (4.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PSY 8026 - Neuro-Immune Interactions (3.0 cr)
PBH 6159 - Principles of Toxicology I (2.0 cr)
PUBH 6180 - Principles of Toxicology II (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 8160 - Advanced Toxicology (2.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5240 - Advanced Small Animal Pathobiology I (1.0 cr)
VMED 5243 - Advanced Small Animal Pathobiology IV (1.0 cr)

Mathematics, Biostatistics and Statistics

Select at least one course from the following in consultation with the advisor:
BIOL 5272 - Applied Biostatistics (4.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
IE 8521 - Optimization (4.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5385 - Introduction to Computational Algebraic Geometry (4.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5467 - Introduction to the Mathematics of Imaging Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5583 - Complex Analysis (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5707 - Graph Theory and Non-enumerative Combinatorics (4.0 cr)
MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8584 - Theory of Partial Differential Equations (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6451 - Optimization and Simulation for Decision Making (3.0 cr)
PUBH 6310 - Clinical Epidemiology I (1.0 cr)
PUBH 6311 - Clinical Epidemiology II (1.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6366 - Modeling and Mapping for Infectious Disease Epidemiology (2.0 cr)
PUBH 6386 - Biostatistics I (3.0 cr)
PUBH 6379 - Cancer Epidemiology (2.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7407 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 8401 - Linear Models (3.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
PUBH 8472 - Spatial Biostatistics (3.0 cr)
PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5052 - Statistical and Machine Learning (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8111 - Mathematical Statistics I (3.0 cr)
STAT 8311 - Linear Models (3.0 cr)
VMED 5442 - Quantitative Methods for Population Health (3.0 cr)
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)

Computer Science, Informatics, Computational Biology and System Biology
Select at least one course from the following in consultation with the advisor:

BMEN 4013 - CAD of Biomechanical/transport Devices (1.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5106 - Programming Languages (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5161 - Introduction to Compilers (3.0 cr)
CSCI 5204 - Advanced Computer Architecture (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5485 - Introduction to Computing for Biologists (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8591 - Predictive Learning from Data (3.0 cr)
GCD 5005 - Computer Programming for Biology (3.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5470 - Programming Essentials for the Health Sciences (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
HINF 5560 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
HINF 8220 - Computational Causal Analytics (3.0 cr)
HINF 8430 - Foundations of Health Informatics I Lab (2.0 cr)
HINF 8440 - Foundations of Translational Bioinformatics Lab (2.0 cr)
MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

Electives (9 credits)
Select courses from the following for a total of 9 credits. Other courses may be applied to this requirement with director of graduate studies approval.

AGRO 5021 - Plant Breeding Principles (3.0 cr)
AGRO 5121 - Applied Experimental Design (4.0 cr)
AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
BICB 5620 Topics in BICB 0.50 - 4.00 credits [OPT] (Rochester campus)
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CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8970 - Computer Science Colloquium (1.0 cr)
CSCI 8991 - Independent Study (1.0 - 3.0 cr)
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
DSCI 8970 - Data Science M.S. Colloquium (1.0 cr)
ECP 5220 - Regulatory Issues in Drug Research (2.0 cr)
ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
ECP 8230 - Principles of Clinical Pharmacology (2.0 cr)
ECP 8500 - Advances in Pharmacometrics Modeling and Simulation (1.0 cr)
ECP 8503 - Intermediate Population PK/PD Methods (2.0 cr)
EE 4389W - Introduction to Predictive Learning [WI] (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5340 - Introduction to Quantum Computing and Physical Basics of Computing (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5616 - Antenna Theory and Design (3.0 cr)
EE 5811 - Biological Instrumentation (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
EEB 5042 - Quantitative Genetics (3.0 cr)
GCD 4151 - Molecular Biology of Cancer (3.0 cr)
GCD 5005 - Computer Programming for Biology (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8103 - Human Histology (5.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
GCD 8171 - Literature Analysis (1.0 - 2.0 cr)
GCD 8920 - Special Topics (1.0 - 4.0 cr)
GRD 4999 - Graduate Summer Research (0.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
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<td>MEDC 8413</td>
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<td>Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)</td>
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PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
PHSL 5101 - Human Physiology (5.0 cr)
PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
PHSL 5444 - Muscle (3.0 cr)
PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
PHSL 6051 - Systems Physiology (4.0 cr)
PHSL 8232 - Critical Reading of Journal Articles in Physiology (2.0 cr)
PHSL 8294 - Research in Physiology (1.0 - 18.0 cr)
PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PMB 8900 - Seminar (1.0 cr)
PSY 8026 - Neuro-Immune Interactions (3.0 cr)
PUBH 6159 - Principles of Toxicology I (2.0 cr)
PUBH 6160 - Principles of Toxicology II (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6310 - Clinical Epidemiology I (1.0 cr)
PUBH 6311 - Clinical Epidemiology II (1.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6366 - Modeling and Mapping for Infectious Disease Epidemiology (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8160 - Advanced Toxicology (2.0 cr)
PUBH 8401 - Linear Models (3.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
PUBH 8472 - Spatial Biostatistics (3.0 cr)
PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
SCB 5054 - Stem Cell Institute Research Seminar and Journal Club (2.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
SCO 8892 - Readings in Supply Chain and Operations (1.0 - 8.0 cr)
SCO 8894 - Research in Supply Chain and Operations (1.0 - 8.0 cr)
SENG 5199 - Topics in Software Engineering (2.0 - 3.0 cr)
SENG 5831 - Software Development for Real-Time Systems (2.0 - 3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5052 - Statistical and Machine Learning (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8111 - Mathematical Statistics I (3.0 cr)
STAT 8311 - Linear Models (3.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
VMED 5190 - Effective Science Communication (2.0 cr)
VMED 5243 - Advanced Small Animal Pathobiology IV (1.0 cr)
VMED 5442 - Quantitative Methods for Population Health (3.0 cr)
VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 5930 - Antimicrobial Resistance (AMR) from a One Health Perspective (1.0 cr)
VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)
WRIT 5051 - Graduate Research Writing for International Students (3.0 cr)
WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

Thesis Credits (24 credits)
Take 24 credits after passing preliminary oral exam.
BICB 8888 - Thesis Credit: (Rochester campus)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Biomedical Engineering M.S.
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax 612-626-6583)
Email: bmengps@umn.edu
Website: http://cse.umn.edu/bme

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant to the degree objectives.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A baccalaureate degree in engineering or in a physical or biological science is required.

Other requirements to be completed before admission:
Applicants with an engineering degree do not need to complete any specific coursework prior to applying.

Applicants without an engineering degree must complete:
* math coursework through calculus I, calculus II, and differential equations; and
* at least 1 year of college-level physics, preferably calculus-based.

Special Application Requirements:
The application deadline is March 31 for the following fall semester.

Local applicants for part-time studies may be considered for spring admission on an exception basis. The application deadline for spring admission is November 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required. 

Capstone Project: The Plan B project comprises BMEN 8820 (2 credits), completed in collaboration with the advisor.

Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

A single course may NOT be counted simultaneously toward more than one of the requirements listed below.

Use of one 4xxx course toward program requirements is permitted under certain conditions with director of graduate studies approval.

At least 3 credits selected to satisfy the Biomedical Engineering Courses, Technical Electives, and/or Free Electives requirement must be designated as math- or statistics-intensive.

Plan A and Plan B students must complete at least 3 8xxx-level course credits selected in consultation with the advisor. Options exclude seminars, directed research, project, thesis, and independent study registrations.

Biomedical Engineering Courses (6 credits)
Select 6 credits from the following in consultation with the advisor:
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
BMEN 8001 - Polymeric Biomaterials (3.0 cr)
BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)
BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
BMEN 8421 - Biophotonics (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
BMEN 8502 - Physiological Control Systems (3.0 cr)
BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

Biomedical Engineering Seminars (2 credits)
Take 2 credits, in any combination, in consultation with the advisor:
BMEN 8601 - Biomedical Engineering Seminar (1.0 cr)
BMEN 8602 - Biomedical Engineering Seminar (1.0 cr)

Biology Electives (6 credits)
Select electives from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5444 - Muscle (3.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
BMEN 5031 - Engineering Extracellular Matrices (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
CGSC 8041 - Cognitive Neuroscience (4.0 cr)
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
EEB 5371 - Principles of Systematics (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8103 - Human Histology (5.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
MEDC 5245 - Introduction to Drug Design (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8041 - Design of Cancer Therapeutics (3.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MEDC 8760 - Design of Peptidomimetics (2.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MLSP 5111 - Concepts of Diagnostic Microbiology (3.0 cr)
MLSP 5511 - Principles of Immunobiology (3.0 cr)
MPHY 5172 - Radiation Biology (3.0 cr)
NEUR 5230 - Cerebrovascular Hemodynamics and Diseases I (4.0 cr)
NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
NSC 5462 - Neuroscience Principles of Drug Abuse (2.0 cr)
NSC 5540 - Survey of Biomedical Neuroscience (2.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
NSC 5661 - Behavioral Neuroscience (3.0 cr)
NSC 8208 - Neuropsychopharmacology (3.0 cr)
NSC 8211 - Developmental Neurobiology (4.0 cr)
NSC 8221 - Neurobiology of Pain and Analgesia (3.0 cr)
NSC 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
OBIO 8041 - Molecular Basis of Cellular and Microbial Adhesion (2.0 cr)
PHAR 5700 - Applied Fundamentals of Pharmacotherapy (3.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHSL 5115 - Clinical Physiology I (3.0 cr)
PHSL 5116 - Clinical Physiology II (3.0 cr)
PHSL 5444 - Muscle (3.0 cr)
PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
PSY 5062 - Cognitive Neuropsychology (3.0 cr)
PSY 8041 - Proseminar in Perception (3.0 cr)
RSC 5200 - Introduction to Neuromodulation (1.0 - 3.0 cr)
RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
RSC 5281 - Physiology for Physical Rehabilitation (2.0 - 4.0 cr)
RSC 5402 - The Shoulder in Sports Rehabilitation Science (3.0 cr)
RSC 8282 - Problems in Human Movement (4.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
SLHS 5802 - Hearing Aids I (3.0 cr)
SLHS 5806 - Auditory Disorders in Children (3.0 cr)
SLHS 8802 - Hearing Aids II (3.0 cr)

Technical Electives (6 to 9 credits)
Plan A students select at least 6 credits, and Plan B and Plan C students select at least 9 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 8233 - Multi-phase Flows: Fundamentals, Measurement, and Modeling (3.0 cr)
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<td>EE 5621</td>
<td>Physical Optics</td>
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<td>Predictive Learning from Data</td>
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<td>Advanced Electromagnetic Theory</td>
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<td>Foundations of Health Informatics I</td>
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<td>HINF 5431</td>
<td>Foundations of Health Informatics II</td>
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<td>HUMF 5001</td>
<td>Foundations of Human Factors/Ergonomics</td>
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<td>Human Factors and Work Analysis</td>
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<td>Basic Theory of Probability and Statistics</td>
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<td>Computational Heat Transfer and Fluid Flow</td>
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<td>MPHY 5170</td>
<td>Radiation Therapy Physics I</td>
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<tr>
<td>MPHY 5171</td>
<td>Medical and Health Physics of Imaging I</td>
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<td>MPHY 5174</td>
<td>Medical and Health Physics of Imaging II</td>
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<td>Physical Principles of Magnetic Resonance Imaging</td>
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<td>Advanced Physics of Magnetic Resonance Imaging (MRI)</td>
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<tr>
<td>NSC 5202</td>
<td>Theoretical Neuroscience: Systems and Information Processing</td>
<td>3.0 cr</td>
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<td>OBIO 8027</td>
<td>Biomaterials in Regenerative Dentistry</td>
<td>2.0 cr</td>
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<tr>
<td>PDES 5704</td>
<td>Computer-Aided Design Methods</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 5038W</td>
<td>Introduction to Neural Networks</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 5065</td>
<td>Functional Imaging: Hands-on Training</td>
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<td>PUBH 6450</td>
<td>Biostatistics I</td>
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<td>PUBH 6451</td>
<td>Biostatistics II</td>
<td>4.0 cr</td>
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<tr>
<td>PUBH 7440</td>
<td>Introduction to Bayesian Analysis</td>
<td>3.0 cr</td>
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<td>PUBH 7475</td>
<td>Statistical Learning and Data Mining</td>
<td>3.0 cr</td>
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<tr>
<td>RSC 5135</td>
<td>Advanced Biomechanics I: Kinematics</td>
<td>3.0 cr</td>
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<tr>
<td>RSC 5235</td>
<td>Advanced Biomechanics II: Kinetics</td>
<td>3.0 cr</td>
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<tr>
<td>RSC 5841</td>
<td>Applied Data Acquisition and Processing</td>
<td>3.0 cr</td>
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<td>Human Kinematics</td>
<td>3.0 cr</td>
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<td>RSC 8235</td>
<td>Human Kinetics</td>
<td>3.0 cr</td>
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<td>STAT 5021</td>
<td>Statistical Analysis</td>
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<td>STAT 5101</td>
<td>Theory of Statistics I</td>
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<tr>
<td>STAT 5102</td>
<td>Theory of Statistics II</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 5302</td>
<td>Applied Regression Analysis</td>
<td>4.0 cr</td>
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</table>
Free Electives (0-7 credits)
Plan B students select at least 5 credits, and Plan C students select at least 7 credits from the following to complete minimum credit requirements. Other courses may be applied with advisor and director of graduate studies approval. Plan A students are exempt from this requirement.
BMEN 8402 - New Product Design and Business Development (4.0 cr)
BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
BTHX 5120 - Dying in Contemporary Medical Culture (2.0 cr)
BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
BTHX 5300 - Foundations of Bioethics (3.0 cr)
BTHX 5325 - Biomedical Ethics (3.0 cr)
BTHX 5650 - Disability Ethics (3.0 cr)
BTHX 8120 - Dying in Contemporary Medical Culture (2.0 cr)
BTHX 8610 - Medical Consumerism (3.0 cr)
CMB 5912 - Creativity (1.0 cr)
MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)
MOT 5003 - Technological Business Planning Workshop (1.0 cr)
MPHY 5040 - Introduction to Medical Physics (3.0 cr)
PDES 5701 - User-Centered Design Studio (4.0 cr)
PDES 5702 - Visual Communication (3.0 cr)
PDES 5704 - Computer-Aided Design Methods (3.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PUBH 6161 - Regulatory Toxicology (2.0 cr)
PUBH 8414 - Biostatistical Literacy (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
RSC 5106 - Introduction to Rehabilitation Science (1.0 cr)
SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
SLHS 5802 - Hearing Aids I (3.0 cr)
SLHS 5804 - Cochlear Implants (3.0 cr)
SLHS 8802 - Hearing Aids II (3.0 cr)

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
BMEN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
-OR-

Plan B
Project Credits (2 credits)
Take 2 credits of the following:
BMEN 8820 - Plan B Project (2.0 - 3.0 cr)
-OR-

Math- or Statistics-intensive Courses
At least 6 credits selected to satisfy the Biomedical Engineering Courses, Technical Electives, and/or Free Electives requirement must be designated as math- or statistics-intensive.
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 8233 - Multi-phase Flows: Fundamentals, Measurement, and Modeling (3.0 cr)
AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
BMEN 5111 - Biomedical Ultrasound (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
BMEN 8502 - Physiological Control Systems (3.0 cr)
Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Integrated B.Bm.E./M.S.
The integrated BBmE/MS-Biomedical Engineering program offers students the opportunity to earn both degrees in five years. Students admitted to the integrated program can apply 3 to 16 credits taken their senior year beyond those required for the BBmE to MS degree requirements. Courses cannot be double-counted toward both BBmE and MS requirements. To be eligible for the integrated program, BBmE students must have completed BMEN 2101, 2401, 2501, 3011, 3015, 3111, 3115, 3211, 3215, 3311, 3315, 3411, and 3415 at the time of application. A 3.60 minimum GPA for these courses is preferred, but not required.

Upon admission, students must maintain timely degree progress to ensure all undergraduate degree requirements are completed by the end of their fourth year.
Twin Cities Campus

Biomedical Engineering Minor

Department of Biomedical Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax: 612-626-6583)
Email: bmengp@umn.edu
Website: https://cse.umn.edu/bme

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Biomedical Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

Minor field coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.0.

Core Coursework (3 to 6 credits)
Masters students select 3 to 6 credits, and doctoral student select 6 credits from the following in consultation with the Biomedical Engineering director of graduate studies:
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
BMEN 8001 - Polymeric Biomaterials (3.0 cr)
BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)
BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
BMEN 8421 - Biophotonics (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
BMEN 8502 - Physiological Control Systems (3.0 cr)
BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Electives (0 to 3 credits)
Masters students select credits from the following as needed, in consultation with the Biomedical Engineering director of graduate studies, to complete the 6-credit minimum.

BMEN 5031 - Engineering Extracellular Matrices (3.0 cr)
BMEN 5041 - Tissue Engineering (3.0 cr)
BMEN 5111 - Biomedical Ultrasound (3.0 cr)
BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 5361 - 3D Bioprinting (2.0 cr)
BMEN 5411 - Neural Engineering (3.0 cr)
BMEN 5412 - Neuromodulation (3.0 cr)
BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5601 - Cardiovascular Devices (1.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 5910 - Special Topics in Biomedical Engineering (3.0 cr)
BMEN 5920 - Special Topics in Biomedical Engineering (1.0 - 3.0 cr)
BMEN 8401 - New Product Design and Business Development (4.0 cr)
BMEN 8402 - New Product Design and Business Development (4.0 cr)
BMEN 8900 - Special Topics in Biomedical Engineering (1.0 - 4.0 cr)

Doctoral
A single course may not be counted toward more than one requirement.

Biology Elective (3 credits)
Select 3 credits from the following in consultation with the Biomedical Engineering director of graduate studies. Other courses may be applied to this requirement with the approval of the Biomedical Engineering director of graduate studies.
BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5444 - Muscle (3.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
CGSC 8041 - Cognitive Neuroscience (4.0 cr)
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
EEB 5371 - Principles of Systematics (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8103 - Human Histology (5.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
MEDC 5245 - Introduction to Drug Design (3.0 cr)
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<tr>
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<th>Course Title</th>
<th>Credits</th>
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<td>Design of Cancer Therapeutics</td>
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<tr>
<td>MEDC 8753</td>
<td>MOLECULAR TARGETS OF DRUG DISCOVERY</td>
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<tr>
<td>MEDC 8760</td>
<td>Design of Peptidomimetics</td>
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<td>MICA 8002</td>
<td>Structure, Function, and Genetics of Bacteria and Viruses</td>
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<td>MICA 8003</td>
<td>Immunity and Immunopathology</td>
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<td>MICA 8004</td>
<td>Cellular and Cancer Biology</td>
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<td>MICA 8009</td>
<td>Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death</td>
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<td>MLSP 5111</td>
<td>Concepts of Diagnostic Microbiology</td>
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<td>MPHY 5172</td>
<td>Radiation Biology</td>
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<tr>
<td>NEUR 5230</td>
<td>Cerebrovascular Hemodynamics and Diseases I</td>
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<td>NSC 5461</td>
<td>Cellular and Molecular Neuroscience</td>
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<td>NSC 5540</td>
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<td>Systems Neuroscience</td>
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<td>NSC 5661</td>
<td>Behavioral Neuroscience</td>
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<td>NSC 8211</td>
<td>Developmental Neurobiology</td>
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<td>NSC 8221</td>
<td>Neurobiology of Pain and Analgesia</td>
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<td>NSCI 5101</td>
<td>Neurobiology I: Molecules, Cells, and Systems</td>
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<td>Basic Concepts in Skeletal Biology</td>
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<td>OBIO 8028</td>
<td>Molecular Basis of Cellular and Microbial Adhesion</td>
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<td>PHAR 5700</td>
<td>Applied Fundamentals of Pharmacotherapy</td>
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<td>PHSL 5061</td>
<td>Principles of Physiology for Biomedical Engineering</td>
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<td>PHSL 5115</td>
<td>Clinical Physiology I</td>
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<td>PHSL 5444</td>
<td>Muscle</td>
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<td>PHSL 5510</td>
<td>Advanced Cardiac Physiology and Anatomy</td>
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<td>PHSL 5525</td>
<td>Anatomy and Physiology of the Pelvis and Urinary System</td>
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<td>Cognition, Computation, and Brain</td>
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<td>Cognitive Neuropsychology</td>
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<td>PSY 8041</td>
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<td>RSC 5200</td>
<td>Introduction to Neuromodulation</td>
<td>1.0 - 3.0 cr</td>
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<td>RSC 5231</td>
<td>Clinical Biomechanics</td>
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<td>RSC 5281</td>
<td>Physiology for Physical Rehabilitation</td>
<td>2.0 - 4.0 cr</td>
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<td>RSC 8282</td>
<td>Problems in Human Movement</td>
<td>4.0 cr</td>
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<td>SCB 8181</td>
<td>Stem Cell Biology</td>
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<td>SLHS 5808</td>
<td>Pathophysiology of Hearing Disorders</td>
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**Technical Elective (3 credits)**

Select 3 credits from the following in consultation with the Biomedical Engineering director of graduate studies. Other courses may be applied to this requirement with the approval of the Biomedical Engineering director of graduate studies.

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<td>AEM 5451</td>
<td>Optimal Estimation</td>
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<td>AEM 5501</td>
<td>Continuum Mechanics</td>
<td>3.0 cr</td>
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<td>AEM 5503</td>
<td>Theory of Elasticity</td>
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<td>AEM 8511</td>
<td>Advanced Topics in Continuum Mechanics</td>
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<td>AEM 8531</td>
<td>Fracture Mechanics</td>
<td>3.0 cr</td>
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<td>BBE 5301</td>
<td>Applied Surface and Colloid Science</td>
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<tr>
<td>BIOC 5351</td>
<td>Protein Engineering</td>
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<tr>
<td>BIOC 5352</td>
<td>Biotechnology and Bioengineering for Biochemists</td>
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<tr>
<td>BIOC 5528</td>
<td>Spectroscopy and Kinetics</td>
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<td>BIOC 8005</td>
<td>Biochemistry: Structure and Catalysis</td>
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<td>Advanced Biomaterials</td>
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<td>BMEN 5041</td>
<td>Tissue Engineering</td>
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<td>BMEN 5101</td>
<td>Advanced Bioelectricity and Instrumentation</td>
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<tr>
<td>BMEN 5111</td>
<td>Biomedical Ultrasound</td>
<td>3.0 cr</td>
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<tr>
<td>BMEN 5151</td>
<td>Introduction to BioMEMS and Medical Microdevices</td>
<td>2.0 cr</td>
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<tr>
<td>BMEN 5201</td>
<td>Advanced Biomechanics</td>
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<tr>
<td>BMEN 5311</td>
<td>Advanced Biomedical Transport Processes</td>
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<td>BMEN 5321</td>
<td>Microfluidics in Biology and Medicine</td>
<td>3.0 cr</td>
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<td>BMEN 5351</td>
<td>Cell Engineering</td>
<td>3.0 cr</td>
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<td>BMEN 5361</td>
<td>3D Bioprinting</td>
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<td>BMEN 5401</td>
<td>Advanced Biomedical Imaging</td>
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<td>Neural Engineering</td>
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<td>BMEN 5413</td>
<td>Neural Decoding and Interfacing</td>
<td>3.0 cr</td>
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<tr>
<td>BMEN 5421</td>
<td>Introduction to Biomedical Optics</td>
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<tr>
<td>BMEN 5601</td>
<td>Cardiovascular Devices</td>
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</table>
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5281 - Feedback Control Systems (4.0 cr)
ME 5286 - Robotics (4.0 cr)
ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 8254 - Fundamentals of Microelectromechanical Systems (MEMS) (4.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8342 - Convection (3.0 cr)
ME 8343 - Radiation (3.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
MPHY 5170 - Radiation Therapy Physics I (3.0 cr)
MPHY 5178 - Physical Principles of Magnetic Resonance Imaging (3.0 cr)
MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
OBIO 8027 - Biomaterials in Regenerative Dentistry (2.0 cr)
PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
RSC 8135 - Human Kinematics (3.0 cr)
RSC 8235 - Human Kinetics (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
Twin Cities Campus
Biomedical Engineering Ph.D.
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax: 612-626-6583)
Email: bmengp@umn.edu
Website: https://cse.umn.edu/bme

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A baccalaureate degree in engineering or in a physical or biological science is required.

Other requirements to be completed before admission:
Applicants with an engineering degree do not need to complete any specific coursework prior to applying.

Applicants without an engineering degree must complete:
*math coursework through calculus I, calculus II, and differential equations; and
*at least one year of college-level physics, preferably calculus-based.

Special Application Requirements:
The application deadline is December 15 for the following fall semester. Admission is for fall semester only.

International applicants must submit score(s) from one of the following tests:
* TOEFL
* IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

A single course may NOT be counted simultaneously toward more than one of the requirements listed below.

Use of one 4xxx course toward program requirements is permitted under certain conditions with director of graduate studies approval.

At least 6 credits selected to satisfy the Biomedical Engineering Courses, Technical Electives, and/or Free Electives requirement must be designated as math- or statistics-intensive.

**Biomedical Engineering Courses (6 credits)**
Select 6 credits from the following in consultation with the advisor:

- BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)
- BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
- BMEN 8351 - Bioheat and Mass Transfer (3.0 cr)
- BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
- BMEN 8502 - Physiological Control Systems (3.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

**Biomedical Engineering Seminars (3 credits)**
Take 3 credits, in any combination, in consultation with the advisor:

- BMEN 8601 - Biomedical Engineering Seminar (1.0 cr)
- BMEN 8602 - Biomedical Engineering Seminar (1.0 cr)

**Ethics Course (2 credits)**
Take the following course:
- BMEN 8611 - Professional Skills and Ethics for Biomedical Engineers (2.0 cr)

**Biology Electives (6 credits)**
Select 6 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.

- BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5444 - Muscle (3.0 cr)
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8002 - Signal Transduction and Gene Expression (3.0 cr)
- BMEN 5031 - Engineering Extracellular Matrices (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
- CGSC 8041 - Cognitive Neuroscience (4.0 cr)
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- EEB 5371 - Principles of Systematics (3.0 cr)
- GCD 5036 - Molecular Cell Biology (3.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- GCD 8103 - Human Histology (5.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
- MEDC 5245 - Introduction to Drug Design (3.0 cr)
- MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
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<td>Neurobiology of Pain and Analgesia (3.0 cr)</td>
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<td>Neurobiology I: Molecules, Cells, and Systems (3.0 cr)</td>
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<td>Applied Fundamentals of Pharmacotherapy (3.0 cr)</td>
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<td>Muscle (3.0 cr)</td>
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<td>PHSL 5510</td>
<td>Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)</td>
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<td>Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)</td>
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<td>Cognition, Computation, and Brain (3.0 cr)</td>
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<td>Cognitive Neuropsychology (3.0 cr)</td>
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<td>Proseminar in Perception (3.0 cr)</td>
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<td>Clinical Biomechanics (2.0 - 5.0 cr)</td>
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<td>Physiology for Physical Rehabilitation (2.0 - 4.0 cr)</td>
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<td>The Shoulder in Sports Rehabilitation Science (3.0 cr)</td>
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<td>Auditory Disorders in Children (3.0 cr)</td>
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<td>SLHS 5808</td>
<td>Pathophysiology of Hearing Disorders (3.0 cr)</td>
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<td>SLHS 8802</td>
<td>Hearing Aids II (3.0 cr)</td>
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**Technical Electives (9 credits)**
Select 9 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.

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<td>Theory of Elasticity (3.0 cr)</td>
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<td>Multi-phase Flows: Fundamentals, Measurement, and Modeling (3.0 cr)</td>
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<td>Advanced Topics in Continuum Mechanics (3.0 cr)</td>
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<td>Biotechnology and Bioengineering for Biochemists (3.0 cr)</td>
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<td>BMEN 5321</td>
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BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5361 - 3D Bioprinting (2.0 cr)
BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
BMEN 5411 - Neural Engineering (3.0 cr)
BMEN 5412 - Neuromodulation (3.0 cr)
BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
BMEN 5601 - Cardiovascular Devices (1.0 cr)
BMEN 5910 - Special Topics in Biomedical Engineering (3.0 cr)
BMEN 8001 - Polymeric Biomaterials (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)
BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
BMEN 8381 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
BMEN 8502 - Physiological Control Systems (3.0 cr)
BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEN 5751 - Biochemical Engineering (3.0 cr)
CHEN 8101 - Fluid Mechanics (3.0 cr)
CHEN 8201 - Applied Math (3.0 cr)
CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CSCI 5103 - Operating Systems (3.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
EE 5141 - Introduction to Microsystem Technology (4.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5323 - VLSI Design I (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5545 - Digital Signal Processing Design (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
EE 8601 - Advanced Electromagnetic Theory (3.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5522 - Quality Engineering and Reliability (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5553 - Simulation (4.0 cr)
KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
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<tr>
<td>STAT 5302</td>
<td>Applied Regression Analysis (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>STAT 5303</td>
<td>Designing Experiments (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>STAT 5401</td>
<td>Applied Multivariate Methods (3.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>

**Free Electives (4 credits)**

Select 4 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.

- BMEN 8402 - New Product Design and Business Development (4.0 cr)
- BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
- BTHX 5120 - Dying in Contemporary Medical Culture (2.0 cr)
- BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
- BTHX 5300 - Foundations of Bioethics (3.0 cr)
- BTHX 5325 - Biomedical Ethics (3.0 cr)
- BTHX 5650 - Disability Ethics (3.0 cr)
- BTHX 8120 - Dying in Contemporary Medical Culture (2.0 cr)
- BTHX 8610 - Medical Consumerism (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMB 5912</td>
<td>Creativity (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>MILI 6235</td>
<td>Pharmaceutical Industry: Business and Policy (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>MILI 6995</td>
<td>Medical Industry Valuation Laboratory (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>MOT 5001</td>
<td>Technological Business Fundamentals (2.0 cr)</td>
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</tr>
<tr>
<td>MOT 5002</td>
<td>Creating Technological Innovation (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>MOT 5003</td>
<td>Technological Business Planning Workshop (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>MPHY 5040</td>
<td>Introduction to Medical Physics (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PDES 5701</td>
<td>User-Centered Design Studio (4.0 cr)</td>
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<tr>
<td>PDES 5702</td>
<td>Visual Communication (3.0 cr)</td>
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<tr>
<td>PDES 5704</td>
<td>Computer-Aided Design Methods (3.0 cr)</td>
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<tr>
<td>PHAR 5204</td>
<td>Drugs and the US Healthcare System (3.0 cr)</td>
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</tr>
<tr>
<td>PSY 5036W</td>
<td>Computational Vision [WI] (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6161</td>
<td>Regulatory Toxicology (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6414</td>
<td>Biostatistical Literacy (3.0 cr)</td>
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<tr>
<td>PUBH 7415</td>
<td>Introduction to Clinical Trials (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>RSC 5106</td>
<td>Introduction to Rehabilitation Science (1.0 cr)</td>
<td></td>
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<tr>
<td>SLHS 6606</td>
<td>Introduction to Augmentative and Alternative Communication (3.0 cr)</td>
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<tr>
<td>SLHS 5802</td>
<td>Hearing Aids I (3.0 cr)</td>
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<tr>
<td>SLHS 5804</td>
<td>Cochlear Implants (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>SLHS 8802</td>
<td>Hearing Aids II (3.0 cr)</td>
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</tr>
</tbody>
</table>

**Thesis Credits (24 credits)**

Take 24 doctoral thesis credits after passing the preliminary oral exam.

**BMEN 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Math- or Statistics-intensive Courses**

**Math/Stat Courses**

At least 6 credits selected to satisfy the Biomedical Engineering Courses, Technical Electives, and/or Free Electives requirement must be designated as math- or statistics-intensive.

- **AEM 5451** - Optimal Estimation (3.0 cr)
- **AEM 5501** - Continuum Mechanics (3.0 cr)
- **AEM 5503** - Theory of Elasticity (3.0 cr)
- **AEM 8233** - Multi-phase Flows: Fundamentals, Measurement, and Modeling (3.0 cr)
- **AEM 8511** - Advanced Topics in Continuum Mechanics (3.0 cr)
- **BMEN 5111** - Biomedical Ultrasound (3.0 cr)
- **BMEN 5201** - Advanced Biomechanics (3.0 cr)
- **BMEN 5311** - Advanced Biomedical Transport Processes (3.0 cr)
- **BMEN 8101** - Biomedical Digital Signal Processing (3.0 cr)
- **BMEN 8201** - Advanced Tissue Mechanics (3.0 cr)
- **BMEN 8381** - Bioheat and Mass Transfer (3.0 cr)
- **BMEN 8431** - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- **BMEN 8501** - Dynamical Systems in Biology (3.0 cr)
- **BMEN 8502** - Physiological Control Systems (3.0 cr)
- **CEGE 8401** - Fundamentals of Finite Element Method (3.0 cr)
- **CHEN 8101** - Fluid Mechanics (3.0 cr)
- **CHEN 8201** - Applied Math (3.0 cr)
- **CHEN 8402** - Statistical Thermodynamics and Kinetics (3.0 cr)
- **CHEN 8754** - Systems Analysis of Biological Processes (3.0 cr)
- **CSCI 5521** - Machine Learning Fundamentals (3.0 cr)
- **CSCI 5525** - Machine Learning: Analysis and Methods (3.0 cr)
- **EE 5251** - Optimal Filtering and Estimation (3.0 cr)
- **EE 5521** - Probability and Stochastic Processes (3.0 cr)
- **EE 5542** - Adaptive Digital Signal Processing (3.0 cr)
- **EE 5545** - Digital Signal Processing Design (3.0 cr)
- **EE 5561** - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
- **EE 5601** - Introduction to RF/Microwave Engineering (3.0 cr)
- **EE 5621** - Physical Optics (3.0 cr)
- **EE 8591** - Predictive Learning from Data (3.0 cr)
- **IE 5522** - Quality Engineering and Reliability (4.0 cr)
- **MATH 5248** - Cryptology and Number Theory (4.0 cr)
- **MATH 5445** - Mathematical Analysis of Biological Networks (4.0 cr)
- **MATH 5447** - Theoretical Neuroscience (4.0 cr)
- **MATH 5587** - Elementary Partial Differential Equations I (4.0 cr)
- **MATH 5651** - Basic Theory of Probability and Statistics (4.0 cr)
- **MATH 5652** - Introduction to Stochastic Processes (4.0 cr)

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Information current as of November 07, 2022
MATH 8202 - General Algebra (3.0 cr)
MATH 8253 - Algebraic Geometry (3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8342 - Convection (3.0 cr)
ME 8343 - Radiation (3.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
Twin Cities Campus
Chemical Engineering M.Ch.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Chemical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

The master of chemical engineering (MChE), also known as the professional master's, is designed for working professionals who are interested in obtaining a master's degree part-time. This degree requires a design project.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or other related field.

Other requirements to be completed before admission:
This professional master of engineering degree is designed for employees of local industries who wish to pursue their studies part time. No financial support is available. Applicants should contact the program before applying for admission.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement summarizing research/work experience and motivation for graduate work.

Applications are accepted for fall semester only. December 15 is the application deadline; late applications are considered if space is available.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Approval of advisor and the director of graduate studies is required to apply 4xxx courses to degree requirements.

In addition to the coursework, MChE students are required to complete a design project. The work-related MChE design project consists of an in-depth study of an engineering design. It need not represent a publishable research project. While the amount of work should be the same as for a master's thesis, the project can contain elements that the thesis would not, such as economic considerations, design consultation, and social relevance.

Major Coursework (14 credits)

Core Courses (12 credits)

Select at least 12 credits from this list in consultation with the advisor:

- CHEN 8001 - Structure and Symmetry of Materials (3.0 cr)
- CHEN 8101 - Fluid Mechanics (3.0 cr)
- CHEN 8201 - Applied Math (3.0 cr)
- CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
- CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

Electives

Select credits from the following as needed, in consultation with the advisor, to complete the 14-credit requirement for the major. Other courses may be selected with advisor and director of graduate studies approval.

- CHEN 4214 - Polymers (3.0 cr)
- CHEN 5751 - Biochemical Engineering (3.0 cr)
- CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
- CHEN 5771 - Colloids and Dispersions (3.0 cr)
- CHEN 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
- CHEN 8102 - Introduction to Rheology (2.0 cr)
- CHEN 8104 - Coating Process Fundamentals (2.0 cr)
- CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)

Outside Coursework (6 to 16 credits)

Select credits from the following in consultation with the advisor. Other courses may be selected with advisor and director of graduate studies approval.

- AEM 4511 - Mechanics of Composite Materials (3.0 cr)
- AEM 5321 - Modern Feedback Control (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 5581 - Mechanics of Solids (3.0 cr)
- AEM 8201 - Fluid Mechanics I (3.0 cr)
- AEM 8202 - Fluid Mechanics II (3.0 cr)
- AEM 8203 - Fluid Mechanics III (3.0 cr)
- AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- AEM 8421 - Robust Multivariable Control Design (3.0 cr)
- AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5041 - Tissue Engineering (3.0 cr)
BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8001 - Polymeric Biomaterials (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Micro and Nanotechnology by Self Assembly (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5640 - Introduction to Nano-Optics (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology (4.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
FSCN 8314 - Food Materials Science (2.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
MATH 4428 - Mathematical Modeling (4.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
MATH 4545 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5557 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5558 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8450 - Topics in Numerical Analysis (1.0 - 3.0 cr)
MATS 4214 - Polymers (3.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 5531 - Electrochemical Engineering (3.0 cr)
MATS 5771 - Colloids and Dispersions (3.0 cr)
MATS 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
MATS 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
MATS 8201 - Applied Math (3.0 cr)
MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
MATS 8217 - Transmission Electron Microscopy (3.0 cr)
MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)
MATS 8995 - Special Topics (1.0 - 4.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 8341 - Conduction (3.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

**Thesis Credits**
Take 10 master's thesis credits for the design project.

CHEN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Chemical Engineering M.S.Ch.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Ave SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Chemical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or other related field.

Other requirements to be completed before admission:
CEMS does not admit directly to the MSChE Plan A (with thesis) for full-time study with support.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan C: Plan C requires 18 major credits and 12 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

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Information current as of November 07, 2022
Approval of advisor and the director of graduate studies is required to apply 4xxx courses to degree requirements

**Major Coursework (14 to 18 credits)**

**Core Courses (12 credits)**
Select at least 12 credits from this list in consultation with the advisor:

- CHEN 8001 - Structure and Symmetry of Materials (3.0 cr)
- CHEN 8101 - Fluid Mechanics (3.0 cr)
- CHEN 8201 - Applied Math (3.0 cr)
- CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
- CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

**Electives**
Select credits from the following as needed, in consultation with the advisor, to complete the 14-credit (Plan A) or 18 credit (Plan C) requirement for the major. Other courses may be selected with advisor and director of graduate studies approval.

- CHEN 4214 - Polymers (3.0 cr)
- CHEN 5751 - Biochemical Engineering (3.0 cr)
- CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
- CHEN 5771 - Colloids and Dispersions (3.0 cr)
- CHEN 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
- CHEN 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
- CHEN 8102 - Introduction to Rheology (2.0 cr)
- CHEN 8104 - Coating Process Fundamentals (2.0 cr)
- CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)

**Outside Coursework (6 to 12 credits)**
Plan A students select 6 credits, and Plan C students select 12 credits from the following in consultation with the advisor. Other courses may be selected with advisor and director of graduate studies approval.

- AEM 4511 - Mechanics of Composite Materials (3.0 cr)
- AEM 5321 - Modern Feedback Control (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 5581 - Mechanics of Solids (3.0 cr)
- AEM 8201 - Fluid Mechanics I (3.0 cr)
- AEM 8202 - Fluid Mechanics II (3.0 cr)
- AEM 8203 - Fluid Mechanics III (3.0 cr)
- AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- AEM 8421 - Robust Multivariable Control Design (3.0 cr)
- AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
- AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
- AEM 8525 - Elastic Stability of Materials (3.0 cr)
- AEM 8531 - Fracture Mechanics (3.0 cr)
- AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
- AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
- BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
- BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
- BIOC 5351 - Protein Engineering (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
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MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5841 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 5842 - Numerical Analysis and Scientific Computing (3.0 cr)
MATS 4214 - Polymers (3.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 5531 - Electrochemical Engineering (3.0 cr)
MATS 5771 - Colloids and Dispersions (3.0 cr)
MATS 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
MATS 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
MATS 8201 - Applied Math (3.0 cr)
MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
MATS 8217 - Transmission Electron Microscopy (3.0 cr)
MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)
MATS 8995 - Special Topics (1.0 - 4.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 8341 - Conduction (3.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
CHEN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Chemical Engineering Minor
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Ave SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research in the Chemical Engineering and Materials Science (CEMS) Department spans all aspects of chemical and materials engineering ranging from fluid mechanics, transport, catalysis, and reactor design to bioengineering, renewable energy, polymer synthesis and processing, and advanced semiconductor growth and characterization. A strong tradition in mathematical modeling and computation complements experimental efforts. The research of CEMS core faculty and affiliated graduate faculty is organized into 14 themes: applied and computational mathematics; biological engineering; catalysis, separations and reaction engineering; electrochemical materials and devices; electronic, magnetic and photonic materials; electron microscopy; energy; materials processing; materials theory; nanomaterials and nanotechnology; nanomechanics and plasticity; polymer science and engineering; systems engineering; and transport and fluid mechanics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Chemical Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor programs must be approved by the Chemical Engineering director of graduate studies.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Minor Courses (6-12 credits)
Master's students select a minimum of 6 credits, and doctoral students select a minimum of 12 credits in consultation with the Chemical Engineering director of graduate studies.
CHEN 8001 - Structure and Symmetry of Materials (3.0 cr)
CHEN 8101 - Fluid Mechanics (3.0 cr)
CHEN 8201 - Applied Math (3.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Chemical Engineering Ph.D.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or related field.

Other requirements to be completed before admission:
Three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement summarizing research/work experience and motivation for graduate work. International students are required to provide TOEFL results.

Special Application Requirements:
Applications are accepted for fall semester only. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for fellowships and assistantships; late applications are considered if space is available.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
18 to 27 credits are required in the major.
6 to 15 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Approval of advisor and the director of graduate studies is required to apply 4xxx courses to degree requirements.

Students must attend the departmental seminar for six semesters. Registration is not required; informal attendance will be done within the department.

Major Coursework (18 to 27 credits)
Core Courses (12 credits)
Select at least 12 credits from this list in consultation with the advisor:
CHEN 8001 - Structure and Symmetry of Materials (3.0 cr)
CHEN 8101 - Fluid Mechanics (3.0 cr)
CHEN 8201 - Applied Math (3.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

Electives
Select credits from the following as needed, in consultation with the advisor, to complete the major field credit requirement. Other courses may be selected with advisor and director of graduate studies approval.
CHEN 4214 - Polymers (3.0 cr)
CHEN 5751 - Biochemical Engineering (3.0 cr)
CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
CHEN 5771 - Colloids and Dispersions (3.0 cr)
CHEN 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
CHEN 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
CHEN 8102 - Introduction to Rheology (2.0 cr)
CHEN 8104 - Coating Process Fundamentals (2.0 cr)
CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)

Outside Coursework (6 to 15 credits)
Select 6 to 15 credits from the following as needed, in consultation with the advisor, to meet the outside and total course credits required. Other courses may be selected with advisor director of graduate studies approval.
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8203 - Fluid Mechanics III (3.0 cr)
AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
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<td>Protein Engineering (3.0 cr)</td>
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<td>Biotechnology and Bioengineering for Biochemists (3.0 cr)</td>
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<td>Spectroscopy and Kinetics (4.0 cr)</td>
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<td>BIOC 6021</td>
<td>Biochemistry (3.0 cr)</td>
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<td>Microfluidics in Biology and Medicine (3.0 cr)</td>
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<td>Cell Engineering (3.0 cr)</td>
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<td>Theory of Unit Operations (4.0 cr)</td>
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<td>CHEM 5210</td>
<td>Materials Characterization (4.0 cr)</td>
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<td>CHEM 5755</td>
<td>X-Ray Crystallography (4.0 cr)</td>
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<td>CHEM 8011</td>
<td>Mechanisms of Chemical Reactions (4.0 cr)</td>
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<td>Computational Chemistry (4.0 cr)</td>
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<tr>
<td>CHEM 8151</td>
<td>Analytical Separations and Chemical Equilibria (4.0 cr)</td>
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<td>CHEM 8152</td>
<td>Analytical Spectroscopy (4.0 cr)</td>
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<td>CHEM 8201</td>
<td>Materials Chemistry (4.0 cr)</td>
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<td>Physical Polymer Chemistry (4.0 cr)</td>
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<td>Synthetic Polymer Chemistry (4.0 cr)</td>
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<td>Organic Synthesis (4.0 cr)</td>
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<td>Interpretation of Organic Spectra (4.0 cr)</td>
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<td>Introduction to Chemical Biology (4.0 cr)</td>
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<td>Quantum Mechanics I (4.0 cr)</td>
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<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)</td>
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<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)</td>
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<td>CSCI 5461</td>
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<td>CSCI 5521</td>
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<td>CSCI 5525</td>
<td>Machine Learning: Analysis and Methods (3.0 cr)</td>
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<td>CSCI 8363</td>
<td>Numerical Linear Algebra in Data Exploration (3.0 cr)</td>
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<td>EE 5163</td>
<td>Semiconductor Properties and Devices I (3.0 cr)</td>
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<td>EE 5164</td>
<td>Semiconductor Properties and Devices II (3.0 cr)</td>
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<td>EE 5171</td>
<td>Microelectronic Fabrication (3.0 cr)</td>
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<td>Basic Microelectronics Laboratory (1.0 cr)</td>
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<td>EE 5181</td>
<td>Micro and Nanotechnology by Self Assembly (3.0 cr)</td>
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<td>EE 5231</td>
<td>Linear Systems and Optimal Control (3.0 cr)</td>
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<td>EE 5235</td>
<td>Robust Control System Design (3.0 cr)</td>
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<td>EE 5239</td>
<td>Introduction to Nonlinear Optimization (3.0 cr)</td>
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<td>EE 5251</td>
<td>Optimal Filtering and Estimation (3.0 cr)</td>
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<td>EE 5531</td>
<td>Probability and Stochastic Processes (3.0 cr)</td>
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<td>EE 5561</td>
<td>Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)</td>
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<td>EE 5621</td>
<td>Physical Optics (3.0 cr)</td>
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<td>EE 5622</td>
<td>Physical Optics Laboratory (1.0 cr)</td>
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<td>EE 5624</td>
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<tr>
<td>EE 5640</td>
<td>Introduction to Nano-Optics (3.0 cr)</td>
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<td>EE 5653</td>
<td>Physical Principles of Magnetic Materials (3.0 cr)</td>
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<td>EE 5655</td>
<td>Magnetic Recording (3.0 cr)</td>
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<td>EE 8161</td>
<td>Physics of Semiconductors</td>
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<td>EE 8231</td>
<td>Optimization Theory</td>
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<td>ESCI 5353</td>
<td>Electron Microprobe Theory and Practice</td>
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<td>GCD 4034</td>
<td>Molecular Genetics and Genomics</td>
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<td>GCD 8151</td>
<td>Cellular Biochemistry and Cell Biology</td>
<td>2.0 - 4.0 cr</td>
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<td>GCD 8161</td>
<td>Advanced Cell Biology and Development</td>
<td>2.0 cr</td>
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<td>IE 5531</td>
<td>Engineering Optimization I</td>
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<td>IE 5532</td>
<td>Stochastic Models</td>
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<td>IE 8521</td>
<td>Optimization</td>
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<td>Discrete Optimization</td>
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<td>IE 8532</td>
<td>Stochastic Processes and Queuing Systems</td>
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<td>Mathematical Modeling</td>
<td>4.0 cr</td>
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<td>MATH 4512</td>
<td>Differential Equations with Applications</td>
<td>3.0 cr</td>
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<td>MATH 5445</td>
<td>Mathematical Analysis of Biological Networks</td>
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<td>MATH 5485</td>
<td>Introduction to Numerical Methods I</td>
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<tr>
<td>MATH 5486</td>
<td>Introduction To Numerical Methods II</td>
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<td>MATH 5525</td>
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<td>MATH 5535</td>
<td>Dynamical Systems and Chaos</td>
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<td>MATH 5588</td>
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<td>MATH 5651</td>
<td>Basic Theory of Probability and Statistics</td>
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<td>MATH 5652</td>
<td>Introduction to Stochastic Processes</td>
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<td>MATH 8401</td>
<td>Mathematical Modeling and Methods of Applied Mathematics</td>
<td>3.0 cr</td>
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<td>MATH 8441</td>
<td>Numerical Analysis and Scientific Computing</td>
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<td>MATH 8442</td>
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<td>MATS 4214</td>
<td>Polymers</td>
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<td>MATS 5517</td>
<td>Microscopy of Materials</td>
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<td>MATS 5531</td>
<td>Electrochemical Engineering</td>
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<td>MATS 5771</td>
<td>Colloids and Dispersions</td>
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<td>MATS 5801</td>
<td>Optimization in Chemical and Energy Systems Engineering</td>
<td>3.0 cr</td>
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<td>MATS 5803</td>
<td>Chemical and Materials Technology Commercialization</td>
<td>3.0 cr</td>
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<tr>
<td>MATS 8001</td>
<td>Structure and Symmetry of Materials</td>
<td>3.0 cr</td>
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<tr>
<td>MATS 8002</td>
<td>Thermodynamics and Kinetics</td>
<td>3.0 cr</td>
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<td>MATS 8003</td>
<td>Electronic Properties</td>
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<td>MATS 8004</td>
<td>Mechanical Properties</td>
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<tr>
<td>MATS 8201</td>
<td>Applied Math</td>
<td>3.0 cr</td>
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<tr>
<td>MATS 8211</td>
<td>Physical Chemistry of Polymers</td>
<td>4.0 cr</td>
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<tr>
<td>MATS 8217</td>
<td>Transmission Electron Microscopy</td>
<td>3.0 cr</td>
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<td>MATS 8221</td>
<td>Synthetic Polymer Chemistry</td>
<td>4.0 cr</td>
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<td>MATS 8301</td>
<td>Physical Rate Processes I: Transport</td>
<td>3.0 cr</td>
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<tr>
<td>MATS 8995</td>
<td>Special Topics</td>
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<td>ME 5113</td>
<td>Aerosol/Particle Engineering</td>
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<tr>
<td>ME 5228</td>
<td>Introduction to Finite Element Modeling, Analysis, and Design</td>
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<td>ME 5247</td>
<td>Applied Stress Analysis</td>
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<td>ME 5446</td>
<td>Introduction to Combustion</td>
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<td>ME 8341</td>
<td>Conduction</td>
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<td>MEDC 8753</td>
<td>MOLECULAR TARGETS OF DRUG DISCOVERY</td>
<td>3.0 cr</td>
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<tr>
<td>MICA 8002</td>
<td>Structure, Function, and Genetics of Bacteria and Viruses</td>
<td>4.0 cr</td>
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<td>PHYS 5001</td>
<td>Quantum Mechanics I</td>
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<td>PHYS 5002</td>
<td>Quantum Mechanics II</td>
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<td>PHYS 5081</td>
<td>Introduction to Biopolymer Physics</td>
<td>3.0 cr</td>
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<tr>
<td>PHYS 5201</td>
<td>Thermal and Statistical Physics</td>
<td>3.0 cr</td>
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<tr>
<td>PHYS 5701</td>
<td>Solid-State Physics for Engineers and Scientists</td>
<td>4.0 cr</td>
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<td>PHYS 8001</td>
<td>Advanced Quantum Mechanics</td>
<td>3.0 cr</td>
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<tr>
<td>PHYS 8702</td>
<td>Statistical Mechanics and Transport Theory</td>
<td>3.0 cr</td>
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<td>PHYS 8711</td>
<td>Solid-State Physics I</td>
<td>3.0 cr</td>
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<td>PHYS 8712</td>
<td>Solid-State Physics II</td>
<td>3.0 cr</td>
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<td>STAT 5021</td>
<td>Statistical Analysis</td>
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<td>STAT 5303</td>
<td>Designing Experiments</td>
<td>4.0 cr</td>
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<tr>
<td>STAT 5601</td>
<td>Nonparametric Methods</td>
<td>3.0 cr</td>
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</table>

**Thesis Credits (24 credits)**

Take 24 doctoral thesis credits after passing preliminary oral exam.

**CHEN 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Chemical Physics M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: https://cse.umn.edu/chem/chemical-physics

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on research areas where the techniques of chemistry and physics are combined for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, molecular collisions, chemical dynamics, quantum mechanics, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

An undergraduate degree in chemistry, physics, or a related field is required.

Other requirements to be completed before admission:
Prospective graduate students should have adequate undergraduate preparation in chemistry, physics and mathematics.

Special Application Requirements:
Applications for fall semester must be completed by December 1 in order to be considered for financial support. Applications received after December 1 will be reviewed on a space available basis. The department prefers to admit for fall semester and will only consider spring admission under extenuating circumstances.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 83

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: Each Plan B project should involve a combined total of approximately 160 hours (the equivalent of four full-time weeks) of library research, reading, and/or writing resulting in the preparation of a significant written document. Students who plan to work on Plan B projects independent of the Preliminary Examination should present a plan, after consultation with the chosen instructor for the Plan B project, outlining the number and content of their projects to the director of graduate studies. Projects should be completed to the satisfaction of the instructor; the final grade is determined by the instructor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

Restrictions to application of 4-level credits to degree requirements include:

- Courses cannot be CHEM or PHYS courses
- Courses must be pre-approved by the advisor and director of graduate studies
- A maximum of 8 4-level credits is allowed.

Required Courses (2 credits)

Take CHPH 8601 in fall or spring of the first year of study; take CHEM 8066 spring of the first year.

- CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
- CHPH 8601 - Seminar: Modern Problems in Chemical Physics (1.0 cr)

Major Coursework (18 to 20 credits)

Plan A students select 18 credits, and Plan B students select 20 credits from the following list. Other courses may be chosen with advisor approval.

- CHEM 5210 - Materials Characterization (4.0 cr)
- CHEM 5755 - X-Ray Crystallography (4.0 cr)
- CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
- CHEM 8021 - Computational Chemistry (4.0 cr)
- CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
- CHEM 8152 - Analytical Spectroscopy (4.0 cr)
- CHEM 8153 - Extracting Signal From Noise (5.0 cr)
- CHEM 8155 - Advanced Electroanalytical Chemistry (4.0 cr)
- CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
- CHEM 8201 - Materials Chemistry (4.0 cr)
- CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
- CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
- CHEM 8280 - Special Topics in Materials Chemistry (2.0 - 4.0 cr)
- CHEM 8321 - Organic Synthesis (4.0 cr)
- CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
- CHEM 8352 - Physical Organic Chemistry (4.0 cr)
- CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
- CHEM 8380 - Special Topics in Organic Chemistry (1.0 - 4.0 cr)
- CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
- CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
- CHEM 8413 - Nucleic Acids (4.0 cr)
- CHEM 8480 - Special Topics in Biological Chemistry (2.0 - 4.0 cr)
- CHEM 8541 - Dynamics (4.0 cr)
- CHEM 8551 - Quantum Mechanics I (4.0 cr)
- CHEM 8552 - Quantum Mechanics II (2.0 cr)
- CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
- CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
- CHEM 8563 - Molecular Simulations (2.0 cr)
- CHEM 8564 - Laser Spectroscopy (2.0 cr)
- CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
Plan Options

Plan A

Thesis Credits
Take 10 master's thesis credits.
CHPH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Project Credits (8 credits)
Take the following courses:
CHPH 8081 - M.S. Plan B Project I (4.0 cr)
CHPH 8082 - M.S. Plan B Project II (4.0 cr)
Twin Cities Campus

Chemical Physics Minor
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, University of Minnesota, 137 Smith Hall, 207 Pleasant Street SE, Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: https://cse.umn.edu/chem/chemical-physics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on research areas where the techniques of chemistry and physics are combined for the study of atoms and molecules; their interactions in gases, liquids, and solids, and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, molecular collisions, chemical dynamics, quantum mechanics, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Chemical Physics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Chemistry Coursework (3 to 6 credits)
Master’s students select 3 credits, and doctoral students select 6 credits from the following in consultation with their advisor and the Chemical Physics director of graduate studies:
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8153 - Extracting Signal From Noise (5.0 cr)
CHEM 8155 - Advanced Electroanalytical Chemistry (4.0 cr)

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Information current as of November 07, 2022

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CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8280 - Special Topics in Materials Chemistry (2.0 - 4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8352 - Physical Organic Chemistry (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8480 - Special Topics in Biological Chemistry (2.0 - 4.0 cr)
CHEM 8511 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEM 8563 - Molecular Simulations (2.0 cr)
CHEM 8564 - Laser Spectroscopy (2.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CHEM 8566 - Spin Dynamics (2.0 cr)
CHEM 8567 - Biophysical Chemistry (2.0 cr)
CHEM 8568 - Chemical Bonding at Surfaces (2.0 cr)
CHEM 8569 - Electronic Structure (2.0 cr)
CHEM 8580 - Special Topics in Physical Chemistry (2.0 - 4.0 cr)
CHEM 8715 - Physical Inorganic Chemistry (4.0 cr)
CHEM 8725 - Organometallic Chemistry (4.0 cr)
CHEM 8745 - Advanced Inorganic Chemistry (4.0 cr)
CHEM 8780 - Special Topics in Inorganic Chemistry (2.0 - 4.0 cr)

Physics Coursework (3 to 6 credits)
Master's students select 3 credits and doctoral students select 6 credits from the following in consultation with their advisor and the Chemical Physics director of graduate studies:

PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5011 - Classical Physics I (4.0 cr)
PHYS 5012 - Classical Physics II (4.0 cr)
PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5621 - Introduction to Plasma Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8011 - Quantum Field Theory I (3.0 cr)
PHYS 8012 - Quantum Field Theory II (3.0 cr)
PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
PHYS 8014 - Quantum many Body Systems (3.0 cr)
PHYS 8161 - Atomic and Molecular Structure (3.0 cr)
PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)
PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)
PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
PHYS 8312 - Biological Physics of Macromolecular Systems (3.0 cr)
PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
PHYS 8601 - Plasma Physics I (3.0 cr)
PHYS 8602 - Plasma Physics II (3.0 cr)
PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)
PHYS 8801 - Nuclear Physics I (3.0 cr)
PHYS 8802 - Nuclear Physics II (3.0 cr)
PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)
PHYS 8901 - Elementary Particle Physics I (3.0 cr)
PHYS 8902 - Elementary Particle Physics II (3.0 cr)
PHYS 8911 - Introduction to Supersymmetry (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Chemical Physics Ph.D.
Chemistry
College of Science and Engineering

Contact Information:
Chemical Physics Program, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: https://cse.umn.edu/chem/chemical-physics

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on research areas where the techniques of chemistry and physics are combined for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, molecular collisions, chemical dynamics, quantum mechanics, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

An undergraduate degree in chemistry, physics, or a related field is required.

Other requirements to be completed before admission:
Prospective graduate students should have adequate undergraduate preparation in chemistry, physics and mathematics.

Special Application Requirements:
Applications for fall semester must be completed by December 1 in order to be considered for financial support. Applications received after December 1 will be reviewed on a space available basis. The program prefers to admit for fall semester and will only consider spring admission under extenuating circumstances.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 83

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

Restrictions to application of 4-level credits to degree requirements include:
- Courses cannot be CHEM or PHYS courses
- Courses must be pre-approved by the advisor and director of graduate studies
- A maximum of 8 4-level credits is allowed.

Required Courses (2 credits)
Take CHPH 8601 in fall or spring the first year of study; take CHEM 8066 in spring of the first year.
CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
CHPH 8601 - Seminar: Modern Problems in Chemical Physics (1.0 cr)

Major Coursework (22 credits)
Select courses from the following in consultation with the advisor. Other courses may be chosen with advisor approval.
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8153 - Extracting Signal From Noise (5.0 cr)
CHEM 8155 - Advanced Electroanalytical Chemistry (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8280 - Special Topics in Materials Chemistry (2.0 - 4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8352 - Physical Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8380 - Special Topics in Organic Chemistry (1.0 - 4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8480 - Special Topics in Biological Chemistry (2.0 - 4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEM 8563 - Molecular Simulations (2.0 cr)
CHEM 8564 - Laser Spectroscopy (2.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CHEM 8566 - Spin Dynamics (2.0 cr)
CHEM 8567 - Biophysical Chemistry (2.0 cr)
CHEM 8568 - Chemical Bonding at Surfaces (2.0 cr)
CHEM 8569 - Electronic Structure (2.0 cr)
CHEM 8580 - Special Topics in Physical Chemistry (2.0 - 4.0 cr)
CHEM 8715 - Physical Inorganic Chemistry (4.0 cr)
CHEM 8725 - Organometallic Chemistry (4.0 cr)
CHEM 8735 - Bioinorganic Chemistry (4.0 cr)
CHEM 8745 - Advanced Inorganic Chemistry (4.0 cr)
### CHEM 8780 - Special Topics in Inorganic Chemistry (2.0 - 4.0 cr)
- CHEM 8880 - Special Topics in Chemistry (2.0 - 4.0 cr)

### PHYS 5001 - Quantum Mechanics I (4.0 cr)
- PHYS 5002 - Quantum Mechanics II (4.0 cr)
- PHYS 5011 - Classical Physics I (4.0 cr)
- PHYS 5012 - Classical Physics II (4.0 cr)
- PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)

### PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
- PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
- PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
- PHYS 5621 - Introduction to Plasma Physics (3.0 cr)
- PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
- PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
- PHYS 8011 - Quantum Field Theory I (3.0 cr)
- PHYS 8012 - Quantum Field Theory II (3.0 cr)
- PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
- PHYS 8014 - Quantum many Body Systems (3.0 cr)
- PHYS 8161 - Atomic and Molecular Structure (3.0 cr)
- PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)
- PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
- PHYS 8312 - Biological Physics of Macroscopic Systems (3.0 cr)
- PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
- PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
- PHYS 8601 - Plasma Physics I (3.0 cr)
- PHYS 8602 - Plasma Physics II (3.0 cr)
- PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
- PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)
- PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
- PHYS 8711 - Solid-State Physics I (3.0 cr)
- PHYS 8712 - Solid-State Physics II (3.0 cr)
- PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)
- PHYS 8801 - Nuclear Physics I (3.0 cr)
- PHYS 8802 - Nuclear Physics II (3.0 cr)
- PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)
- PHYS 8901 - Elementary Particle Physics I (3.0 cr)
- PHYS 8902 - Elementary Particle Physics II (3.0 cr)
- PHYS 8911 - Introduction to Supersymmetry (3.0 cr)

### Thesis Credits (24 credits)
Take 24 doctoral thesis credits after the passing preliminary oral exam.

**CHPH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**
Twin Cities Campus
Chemistry M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: https://cse.umn.edu/chem

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While modern research in chemistry is very interdisciplinary, graduate work in the Department of Chemistry falls broadly into the focus areas of analytical chemistry, chemical biology, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, polymer chemistry, experimental physical chemistry, and computational chemistry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

An undergraduate degree in chemistry or a related field is required for admission.

Other requirements to be completed before admission:
Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry that are required of undergraduate majors in the University of Minnesota chemistry curriculum. They must also have at least one year of college physics, plus college mathematics through calculus.

Special Application Requirements:
Applications for fall semester must be completed by December 1 in order to be considered for fellowship support and teaching and research assistantships. Applications received after December 1 will be reviewed on a space available basis. The department prefers to admit for fall semester and will only consider spring admission under extenuating circumstances.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 83

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: Each Plan B project should involve a combined total of approximately 160 hours (the equivalent of four full-time weeks) of library research, reading, and/or writing resulting in the preparation of a significant written document. Students who plan to work on Plan B projects independent of the Preliminary Examination should present a plan, after consultation with the chosen instructor for the Plan B project, outlining the number and content of their projects to the director of graduate studies. Projects should be completed to the satisfaction of the instructor; the final grade is determined by the instructor.

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

All CHEM courses must be taken at the 5xxx or 8xxx level. A maximum of 8 credits in 4xxx-level courses from another department may be used with approval from the director of graduate studies.

Required Courses (2 credits)
Take CHEM 8601 in fall or spring the first year of study; take CHEM 8066 in spring of the first year.

CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
CHEM 8601 - Seminar: Modern Problems in Chemistry (1.0 cr)

Major Courses (18 to 28 credits)
Plan A students select 18 credits, Plan B students select 20 credits, and Plan C students select 28 credits from the following list. Other courses may be applied to this requirement with advisor approval.

BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8102 - Hot Topics in the Biology of Aging (1.0 cr)
BIOL 4004 - Cell Biology (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8153 - Extracting Signal From Noise (5.0 cr)
CHEM 8155 - Advanced Electroanalytical Chemistry (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8280 - Special Topics in Materials Chemistry (2.0 - 4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8352 - Physical Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8380 - Special Topics in Organic Chemistry (1.0 - 4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8480 - Special Topics in Biological Chemistry (2.0 - 4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEM 8563 - Molecular Simulations (2.0 cr)
CHEM 8564 - Laser Spectroscopy (2.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CHEM 8566 - Spin Dynamics (2.0 cr)
CHEM 8567 - Biophysical Chemistry (2.0 cr)
CHEM 8568 - Chemical Bonding at Surfaces (2.0 cr)
CHEM 8569 - Electronic Structure (2.0 cr)
CHEM 8580 - Special Topics in Physical Chemistry (2.0 - 4.0 cr)
CHEM 8715 - Physical Inorganic Chemistry (4.0 cr)
CHEM 8725 - Organometallic Chemistry (4.0 cr)
CHEM 8735 - Bioinorganic Chemistry (4.0 cr)
CHEM 8745 - Advanced Inorganic Chemistry (4.0 cr)
CHEM 8750 - Special Topics in Inorganic Chemistry (2.0 - 4.0 cr)
CHEM 8880 - Special Topics in Chemistry (2.0 - 4.0 cr)
CHEN 5771 - Colloids and Dispersions (3.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 5640 - Introduction to Nano-Optics (3.0 cr)
ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8103 - Scattering from Soft Matter (2.0 cr)
ME 8880 - Introduction to Plasma Technology (3.0 cr)
MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8070 - The Chemistry and Biology of Infectious Diseases (3.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
MEDC 8461 - Design of Cancer Therapeutics (3.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MICH 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

**Plan Options**

**Plan A**
Take 10 master's thesis credits.
- CHEM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B (8 credits)**
Take each of the following project courses for 4 credits:
- CHEM 8081 - M.S. Plan B Project I (1.0 - 4.0 cr)
- CHEM 8082 - M.S. Plan B Project II (1.0 - 4.0 cr)
Twin Cities Campus
Chemistry Minor
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: https://cse.umn.edu/chem

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While modern research in chemistry is very interdisciplinary, graduate work in the Department of Chemistry falls broadly into the focus areas of analytical chemistry, chemical biology, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, polymer chemistry, experimental physical chemistry, and computational chemistry.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Chemistry director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for the minor is 3.00.

Minor Coursework (6-12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Chemistry director of graduate studies. Other courses may be selected with director of graduate studies approval.

CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8153 - Extracting Signal From Noise (5.0 cr)
CHEM 8155 - Advanced Electroanalytical Chemistry (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8280 - Special Topics in Materials Chemistry (2.0 - 4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8352 - Physical Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8380 - Special Topics in Organic Chemistry (1.0 - 4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8480 - Special Topics in Biological Chemistry (2.0 - 4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEM 8563 - Molecular Simulations (2.0 cr)
CHEM 8564 - Laser Spectroscopy (2.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CHEM 8566 - Spin Dynamics (2.0 cr)
CHEM 8567 - Biophysical Chemistry (2.0 cr)
CHEM 8568 - Chemical Bonding at Surfaces (2.0 cr)
CHEM 8569 - Electronic Structure (2.0 cr)
CHEM 8580 - Special Topics in Physical Chemistry (2.0 - 4.0 cr)
CHEM 8715 - Physical Inorganic Chemistry (4.0 cr)
CHEM 8725 - Organometallic Chemistry (4.0 cr)
CHEM 8735 - Bioinorganic Chemistry (4.0 cr)
CHEM 8745 - Advanced Inorganic Chemistry (4.0 cr)
CHEM 8780 - Special Topics in Inorganic Chemistry (2.0 - 4.0 cr)
CHEM 8880 - Special Topics in Chemistry (2.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Chemistry Ph.D.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: https://cse.umn.edu/chem

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While modern research in chemistry is very interdisciplinary, graduate work in the Department of Chemistry falls broadly into the focus areas of analytical chemistry, chemical biology, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, polymer chemistry, experimental physical chemistry, and computational chemistry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

An undergraduate degree in chemistry or a related field is required for admission.

Other requirements to be completed before admission:
Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry that are required of undergraduate majors in the University of Minnesota chemistry curriculum. They must also have at least one year of college physics, plus college mathematics through calculus.

Special Application Requirements:
Applications for fall semester must be completed by December 1 in order to be considered for fellowship support and teaching and research assistantships. Applications received after December 1 will be reviewed on a space available basis. The department prefers to admit for fall semester and will only consider spring admission under extenuating circumstances.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 83

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of November 07, 2022
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

All CHEM courses must be taken at the 5xxx or 8xxx level. A maximum of 8 credits in 4xxx-level courses from other departments may be used with approval from the director of graduate studies.

Required Courses (2 credits)
Take CHEM 8601 in fall or spring the first year of study; take CHEM 8066 in spring of the first year.
CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
CHEM 8601 - Seminar: Modern Problems in Chemistry (1.0 cr)

Major Courses (22 credits)
Select courses from the following list in consultation with the advisor. Other courses may be selected with advisor approval.
BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8102 - Hot Topics in the Biology of Aging (1.0 cr)
BIOL 4004 - Cell Biology (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8153 - Extracting Signal From Noise (5.0 cr)
CHEM 8155 - Advanced Electroanalytical Chemistry (4.0 cr)
CHEM 8157 - Bioanalytical Chemistry (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8280 - Special Topics in Materials Chemistry (2.0 - 4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8352 - Physical Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8380 - Special Topics in Organic Chemistry (1.0 - 4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8413 - Nucleic Acids (4.0 cr)
CHEM 8480 - Special Topics in Biological Chemistry (2.0 - 4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (2.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEM 8563 - Molecular Simulations (2.0 cr)
CHEM 8564 - Laser Spectroscopy (2.0 cr)
CHEM 8565 - Chemical Reaction Dynamics (2.0 cr)
CHEM 8566 - Spin Dynamics (2.0 cr)
CHEM 8567 - Biophysical Chemistry (2.0 cr)
CHEM 8568 - Chemical Bonding at Surfaces (2.0 cr)
CHEM 8569 - Electronic Structure (2.0 cr)
CHEM 8580 - Special Topics in Physical Chemistry (2.0 - 4.0 cr)
CHEM 8715 - Physical Inorganic Chemistry (4.0 cr)
CHEM 8725 - Organometallic Chemistry (4.0 cr)
CHEM 8735 - Bioinorganic Chemistry (4.0 cr)
CHEM 8745 - Advanced Inorganic Chemistry (4.0 cr)
CHEM 8780 - Special Topics in Inorganic Chemistry (2.0 - 4.0 cr)
CHEM 8880 - Special Topics in Chemistry (2.0 - 4.0 cr)
CHEN 5771 - Colloids and Dispersions (3.0 cr)
CHEM 8754 - Systems Analysis of Biological Processes (3.0 cr)
CSCI 4041 - Algorithms and Data Structures (4.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 5640 - Introduction to Nano-Optics (3.0 cr)
ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8103 - Scattering from Soft Matter (2.0 cr)
ME 8362 - Introduction to Plasma Technology (3.0 cr)
MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8070 - The Chemistry and Biology of Infectious Diseases (3.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
MEDC 8461 - Design of Cancer Therapeutics (3.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MICB 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

**Thesis Credits (24 credits)**

Take 24 doctoral thesis credits after passing the preliminary oral exam.

CHEM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Civil Engineering M.C.E.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: https://cse.umn.edu/cege

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Civil Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master in Civil Engineering (MCE) degree is a terminal degree designed for practicing engineers who wish to obtain an advanced degree in the field on a part- or full-time basis. The program offers students the opportunity to focus on one of the following areas of engineering: environmental (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), or water resources (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics and turbulence).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An ABET-accredited, four-year bachelor's degree in engineering is required for admission.

Other requirements to be completed before admission:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
## Program Requirements

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The Plan C requires 100 hours of project work and an oral presentation of no less than 10 minutes.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

### Core Courses (12-30 credits)
Select at least 12 credits from the following in consultation with the advisor. One seminar credit (CEGE 8200, 8300, 8400, 8500) may be applied to this requirement. Students may complete all their coursework from this list.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CEGE 4160</td>
<td>Special Topics</td>
<td>1.0 - 4.0 cr</td>
</tr>
<tr>
<td>CEGE 4201</td>
<td>Principles of Highway Design</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 4253</td>
<td>Pavement Design, Engineering, and Management</td>
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<td>CEGE 4311</td>
<td>Rock Mechanics</td>
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<td>CEGE 4351</td>
<td>Groundwater Mechanics</td>
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<tr>
<td>CEGE 4352</td>
<td>Groundwater Modeling</td>
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<tr>
<td>CEGE 4411</td>
<td>Matrix Structural Analysis</td>
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<tr>
<td>CEGE 4412</td>
<td>Reinforced Concrete II</td>
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<td>CEGE 4413</td>
<td>Steel Design II</td>
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<td>CEGE 4511</td>
<td>Hydraulic Structures</td>
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<td>CEGE 4512</td>
<td>Open Channel Hydraulics</td>
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<tr>
<td>CEGE 4561</td>
<td>Solids and Hazardous Wastes</td>
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<tr>
<td>CEGE 4562</td>
<td>Environmental Remediation Technologies</td>
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<tr>
<td>CEGE 4563</td>
<td>Pollutant Fate and Transport: Processes and Modeling</td>
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<tr>
<td>CEGE 5094</td>
<td>Directed Research</td>
<td>1.0 - 4.0 cr</td>
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<tr>
<td>CEGE 5180</td>
<td>Special Topics</td>
<td>1.0 - 4.0 cr</td>
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<td>CEGE 5211</td>
<td>Traffic Engineering</td>
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<td>CEGE 5212</td>
<td>Transportation Policy, Planning, and Deployment</td>
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<tr>
<td>CEGE 5213</td>
<td>Transit Planning and Management</td>
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<tr>
<td>CEGE 5214</td>
<td>Infrastructure Systems Engineering</td>
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<tr>
<td>CEGE 5219</td>
<td>Air Transportation Systems</td>
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<tr>
<td>CEGE 5341</td>
<td>Wave Methods for Nondestructive Testing</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 5342</td>
<td>Introduction to Inverse Problems</td>
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<tr>
<td>CEGE 5351</td>
<td>Advanced Engineering Mathematics I</td>
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<td>CEGE 5411</td>
<td>Applied Structural Mechanics</td>
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<td>Prestressed Concrete Design</td>
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<td>CEGE 5415</td>
<td>Masonry Structures</td>
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<td>CEGE 5416</td>
<td>Sensors in Infrastructure</td>
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<tr>
<td>CEGE 5417</td>
<td>Structural Engineering Design of Wood Buildings</td>
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<tr>
<td>CEGE 5511</td>
<td>Urban Hydrology and Water Quality</td>
<td>4.0 cr</td>
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<td>CEGE 5512</td>
<td>Stochastic Ecodynamics</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 5513</td>
<td>Energy Conversion from Wind, Hydro and Solar Resources</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 5514</td>
<td>Granular Physics with Environmental and Engineering Applications</td>
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<tr>
<td>CEGE 5515</td>
<td>Remote Sensing of Environment and Water Resources</td>
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<tr>
<td>CEGE 5541</td>
<td>Environmental Water Chemistry</td>
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<td>CEGE 5542</td>
<td>Experimental Methods in Environmental Engineering</td>
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<tr>
<td>CEGE 5543</td>
<td>Introductory Environmental Fluid Mechanics</td>
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<tr>
<td>CEGE 5551</td>
<td>Environmental Microbiology</td>
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<td>CEGE 5552</td>
<td>Environmental Microbiology Laboratory</td>
<td>1.0 cr</td>
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<tr>
<td>CEGE 5570</td>
<td>Design for Sustainable Development - India</td>
<td>3.0 - 9.0 cr</td>
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<tr>
<td>CEGE 8022</td>
<td>Numerical Methods for Free and Moving Boundary Problems</td>
<td>3.0 cr</td>
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<tr>
<td>CEGE 8094</td>
<td>Directed Research</td>
<td>1.0 - 4.0 cr</td>
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<tr>
<td>CEGE 8200</td>
<td>Seminar: Transportation</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>CEGE 8211</td>
<td>Theory of Traffic Flow</td>
<td>4.0 cr</td>
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</table>
CEGE 8212 - Advanced Travel Demand Modeling and Supply Analysis (3.0 cr)
CEGE 8213 - Advanced Transportation Technologies Seminar (1.0 cr)
CEGE 8214 - Transportation Economics (4.0 cr)
CEGE 8215 - Transportation Data Analysis (3.0 cr)
CEGE 8216 - Urban Traffic Operations (3.0 cr)
CEGE 8217 - Transportation Network Analysis (4.0 cr)
CEGE 8218 - Dynamic Transportation Network Analysis (4.0 cr)
CEGE 8231 - Advanced Pavement Engineering (3.0 cr)
CEGE 8300 - Seminar: Geomechanics (1.0 cr)
CEGE 8301 - Fracture of Geomaterials (3.0 cr)
CEGE 8302 - Soil/Rock Plasticity and Limit Analysis (4.0 cr)
CEGE 8311 - Advanced Rock Mechanics (3.0 cr)
CEGE 8321 - Thermoporoelectricity (4.0 cr)
CEGE 8322 - Storage and Flow of Granular Materials (3.0 cr)
CEGE 8331 - Modeling Geomechanical Processes (3.0 cr)
CEGE 8336 - Boundary Element Methods I (3.0 cr)
CEGE 8337 - Boundary Element Methods II (3.0 cr)
CEGE 8341 - Wave Propagation in Solids and Structures (4.0 cr)
CEGE 8342 - Advanced Engineering Mathematics II (3.0 cr)
CEGE 8351 - Advanced Groundwater Mechanics II (3.0 cr)
CEGE 8361 - Engineering Model Fitting (3.0 cr)
CEGE 8400 - Seminar: Structures (1.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8411 - Plate Structures (3.0 cr)
CEGE 8412 - Shell Structures (3.0 cr)
CEGE 8413 - Fracture and Scaling (3.0 cr)
CEGE 8421 - Structural Dynamics (3.0 cr)
CEGE 8422 - Earthquake Engineering (3.0 cr)
CEGE 8431 - Structural Stability (3.0 cr)
CEGE 8432 - Analysis of Thin-Walled Members (3.0 cr)
CEGE 8441 - Ductile Behavior of Steel Structures (3.0 cr)
CEGE 8442 - Nonlinear Analysis of Structural Systems (3.0 cr)
CEGE 8443 - Fracture of Materials and Structures (3.0 cr)
CEGE 8451 - Behavior of Reinforced Concrete Structures (3.0 cr)
CEGE 8461 - Structural Reliability (3.0 cr)
CEGE 8490 - Special Topics (1.0 - 4.0 cr)
CEGE 8500 - Seminar: Environmental (1.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8503 - Environmental Mass Transport (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CEGE 8506 - Stochastic Hydrology (4.0 cr)
CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
CEGE 8541 - Aquatic Chemistry (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8571 - Hydraulic Measurements (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)

Electives (0-18 credits)
Plan A students select courses as needed to complete the 20 course credits required, and Plan C students select courses as needed to complete the 30-credit minimum. Students may complete one course from each of the following cross-listed pairs, but not both: PA 5231 or CEGE 5213; PA 5232 or CEGE 5212; WRS 8581 or CEGE 8581. Courses are selected in consultation with the advisor. Other courses can be selected with advisor and director of graduate studies approval.
AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics ofCrystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
ARCH 5391 - Design and Representation with BIM (3.0 cr)
ARCH 5671 - Historic Preservation (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5513 - Watershed Engineering (3.0 cr)
BBE 5523 - Ecological Engineering Design (3.0 cr)
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BBE 5753 - Air Quality and Pollution Control Engineering (3.0 cr)
BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CHEM 4214 - Polymers (3.0 cr)
CHEM 4601 - Green Chemistry [ENV] (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
ESPM 5068 - Plant Physiological Ecology (3.0 cr)
ESPM 5601 - Limnology (3.0 cr)
ESCI 8801 - Geomicrobiology (3.0 cr)
ESP M 5071 - Ecological Restoration (4.0 cr)
ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
GCC 5005 - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5553 - Simulation (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
ME 5229 - Finite Element Method for Computational Mechanics: Transient/Dynamic Applications (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8332 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)
PA 5233 - Sustainable Transportation (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PMB 4111 - Microbial Physiology and Diversity (3.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
WRS 5101 - Water Policy (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5232 - Transportation Policy, Planning, and Deployment (3.0 cr)
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Plan Options

Plan A

Thesis Credits
Take 10 master's thesis credits for the design project.

CEGE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Civil Engineering M.S.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Civil Engineering master of science (MS) degree balances education in engineering fundamentals and design. The degree prepares students for careers in industry as well as for continued studies at the doctoral level. The degree offers students the opportunity to focus on one of the following areas of engineering: environmental (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), or water resources (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics and turbulence).

The MS thesis (Plan A) option combines coursework with research and development. The project based (Plan B) option offers students an opportunity to include in their coursework program up to 3.0 credits of directed research. The coursework-only (Plan C) option is for practicing engineers who wish to pursue the MS part-time, self-funded full-time students, and students interested in pursuing the PhD.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in an engineering, basic science, or mathematics program is preferred.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's academic record and letters of recommendation.

Applicants who lack civil engineering training are often required to complete one or more appropriate courses from the undergraduate civil engineering program. Courses from the required undergraduate civil engineering curriculum cannot be applied to graduate degree requirements.

Special Application Requirements:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B requires completion of 1 to 3 Plan B papers as determined by the faculty advisor. Plan B papers can include computer programs, annotated bibliographies, field investigations, and analysis/design of special engineering problems.

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The Plan C requires 100 hours of project work and an oral presentation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

**Core Courses (12-30 credits)**

Select at least 12 credits from the following in consultation with the advisor. One seminar credit (CEGE 8200, 8300, 8400, 8500) may be applied to this requirement. Students may complete all their coursework from this list.

- CEGE 4160 - Special Topics (1.0 - 4.0 cr)
- CEGE 4201 - Principles of Highway Design (3.0 cr)
- CEGE 4253 - Pavement Design, Engineering, and Management (4.0 cr)
- CEGE 4311 - Rock Mechanics (4.0 cr)
- CEGE 4351 - Groundwater Mechanics (3.0 cr)
- CEGE 4352 - Groundwater Modeling (3.0 cr)
- CEGE 4411 - Matrix Structural Analysis (3.0 cr)
- CEGE 4412 - Reinforced Concrete II (3.0 cr)
- CEGE 4413 - Steel Design II (3.0 cr)
- CEGE 4511 - Hydraulic Structures (3.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
- CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
- CEGE 4563 - Pollutant Fate and Transport: Processes and Modeling (3.0 cr)
- CEGE 5094 - Directed Research (1.0 - 4.0 cr)
- CEGE 5180 - Special Topics (1.0 - 4.0 cr)
- CEGE 5211 - Traffic Engineering (3.0 cr)
- CEGE 5212 - Transportation Policy, Planning, and Deployment (3.0 cr)
- CEGE 5213 - Transit Planning and Management (3.0 cr)
- CEGE 5214 - Infrastructure Systems Engineering (3.0 cr)
- CEGE 5219 - Air Transportation Systems (3.0 cr)
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CEGE 8506 - Stochastic Hydrology (4.0 cr)
CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
CEGE 8541 - Aquatic Chemistry (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8571 - Hydraulic Measurements (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)

Electives (0-18 credits)

Plan A students select courses as needed to complete the 20 course credits required, and Plan B and C students select courses as needed to complete the 30-credit minimum. Students may complete one course from each of the following cross-listed pairs, but not both: PA 5231 or CEGE 5213; PA 5232 or CEGE 5212; WRS 8581 or CEGE 8581. Courses are selected in consultation with the advisor. Other courses can be selected with advisor and director of graduate studies approval.

AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
ARCH 5391 - Design and Representation with BIM (3.0 cr)
ARCH 5671 - Historic Preservation (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5513 - Watershed Engineering (3.0 cr)
BBE 5523 - Ecological Engineering Design (3.0 cr)
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BBE 5753 - Air Quality and Pollution Control Engineering (3.0 cr)
BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CHEM 4214 - Polymers (3.0 cr)
CHEM 4601 - Green Chemistry [ENV] (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 8011 - Analytical Separations and Chemical Equilibria (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
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<td>Detection and Estimation Theory</td>
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<td>EEB 5068</td>
<td>Plant Physiological Ecology</td>
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<td>EEB 5601</td>
<td>Limnology</td>
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<td>Geomicrobiology</td>
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<td>Ecological Restoration</td>
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<td>Hydrology and Water Quality Field Methods</td>
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<td>Forest Hydrology &amp; Watershed Biogeochemistry</td>
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<td>Innovation for Changemakers: Design for a Disrupted World [GP]</td>
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<td>Principles of Geographic Information Science</td>
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<td>HINF 5502</td>
<td>Python Programming Essentials for the Health Sciences (1.0 cr)</td>
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<td>Systems Engineering I</td>
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<td>Systems Engineering II</td>
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<td>Engineering Optimization I</td>
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<td>Stochastic Models</td>
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<td>Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications</td>
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<td>ME 8285</td>
<td>Control Systems for Intelligent Vehicle Applications</td>
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<td>Geographic Information Systems: Applications in Planning and Policy Analysis</td>
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<td>Exploring and Visualizing Data in R</td>
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<td>Advanced Programming and Data Analysis in R</td>
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**Plan Options**

**Plan A**

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Information current as of November 07, 2022
Take 10 master's thesis credits.
**CEGE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)**

-OR-

**Plan B (0-3 credits)**
Select up to 3 credits of the following, as needed to complete the 30-credit minimum, in consultation with the advisor.
**CEGE 8094 - Directed Research (1.0 - 4.0 cr)**

**Joint- or Dual-degree Coursework:**
- MS-Civil Engineering/MSISyE (Transportation Engineering Focus): 15 common credits
- MS-Civil Engineering/MURP (Transportation or Environmental Engineering Focus): 18 common credits

**Program Sub-plans**
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

**Integrated B.C.E./M.S. - Civil Engineering**
The department offers an integrated Bachelor of Civil Engineering (BCE) and Master of Science (MS) in Civil Engineering. The integrated BCE/MS program offers students the opportunity to earn a bachelor's degree and a master's degree in five years. The integrated program offers several benefits: streamlined admissions from the undergraduate to the graduate program (GRE not required); flexibility in fulfilling required courses for both degrees during the senior year (up to 16 credits can be transferred to the graduate program); and eligibility for teaching and research assistantships.

Eligibility requirements for the integrated program: Application is open to University BCE undergraduates who:
- are within 32 credits of completing the requirements for the bachelors degree;
- have a faculty advisor selected prior to admission; and
- hold a cumulative GPA of 3.3 or higher.

Both the BCE and MS degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MS degree are permitted to count credits originally planned for the graduate program toward their BCE technical electives.

**Integrated B.GeoE./M.S. - Civil Engineering**
The department offers an integrated Bachelor of Geoengineering (BGeoE) and Master of Science (MS) in Civil Engineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the BCE/MS integrated program also apply to the BGeoE/MS-Civil Engineering.

**Integrated B.Env.E./M.S. - Civil Engineering**
The department offers an integrated Bachelor of Environmental Engineering (BEnvE) and Master of Science (MS) in Civil Engineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the BCE/MS integrated program also apply to the BEnvE/MS-Civil Engineering.
Twin Cities Campus
Civil Engineering Minor
CSENG Civil, Envrm & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: https://cse.umn.edu/cege

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Civil Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Minor Coursework (6-12 credits)
Master’s students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Civil Engineering director of graduate studies:

- CEGE 5180 - Special Topics (1.0 - 4.0 cr)
- CEGE 5211 - Traffic Engineering (3.0 cr)
- CEGE 5212 - Transportation Policy, Planning, and Deployment (3.0 cr)
- CEGE 5213 - Transit Planning and Management (3.0 cr)
- CEGE 5214 - Infrastructure Systems Engineering (3.0 cr)
- CEGE 5219 - Air Transportation Systems (3.0 cr)
- CEGE 5341 - Wave Methods for Nondestructive Testing (3.0 cr)
- CEGE 5342 - Introduction to Inverse Problems (3.0 cr)
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CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8571 - Hydraulic Measurements (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Civil Engineering Ph.D.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegespso@umn.edu
Website: https://cse.umn.edu/cege

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Civil Engineering PhD degree combines coursework and independent research in a comprehensive program for those wishing to attain mastery of their field. Students have the opportunity to focus on one of the following areas of engineering: environmental (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), or water resources, (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics and turbulence).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in an engineering, basic science, or mathematics program is preferred.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's academic record and letters of recommendation.

Applicants who lack civil engineering training are often required to complete one or more appropriate courses from the undergraduate civil engineering program. Courses from the required undergraduate civil engineering curriculum cannot be applied to graduate degree requirements.

Special Application Requirements:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
IELTS
- Total Score: 6.5
MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grading basis, unless only offered S/N.

Core Courses (12-36 credits)
Select at least 12 credits from the following in consultation with the advisor. A maximum of 2 seminar credits (CEGE 8200, 8300, 8400, 8500) may be applied to this requirement. Students may complete all their coursework from this list.

CEGE 4160 - Special Topics (1.0 - 4.0 cr)
CEGE 4201 - Principles of Highway Design (3.0 cr)
CEGE 4253 - Pavement Design, Engineering, and Management (4.0 cr)
CEGE 4311 - Rock Mechanics (4.0 cr)
CEGE 4351 - Groundwater Mechanics (3.0 cr)
CEGE 4352 - Groundwater Modeling (3.0 cr)
CEGE 4411 - Matrix Structural Analysis (3.0 cr)
CEGE 4412 - Reinforced Concrete II (3.0 cr)
CEGE 4413 - Steel Design II (3.0 cr)
CEGE 4511 - Hydraulic Structures (3.0 cr)
CEGE 4512 - Open Channel Hydraulics (4.0 cr)
CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
CEGE 4563 - Pollutant Fate and Transport: Processes and Modeling (3.0 cr)
CEGE 5094 - Directed Research (1.0 - 4.0 cr)
CEGE 5180 - Special Topics (1.0 - 4.0 cr)
CEGE 5211 - Traffic Engineering (3.0 cr)
CEGE 5212 - Transportation Policy, Planning, and Deployment (3.0 cr)
CEGE 5213 - Transit Planning and Management (3.0 cr)
CEGE 5214 - Infrastructure Systems Engineering (3.0 cr)
CEGE 5219 - Air Transportation Systems (3.0 cr)
CEGE 5341 - Wave Methods for Nondestructive Testing (3.0 cr)
CEGE 5342 - Introduction to Inverse Problems (3.0 cr)
CEGE 5351 - Advanced Engineering Mathematics I (3.0 cr)
CEGE 5411 - Applied Structural Mechanics (3.0 cr)
CEGE 5414 - Prestressed Concrete Design (3.0 cr)
CEGE 5415 - Masonry Structures (3.0 cr)
CEGE 5416 - Sensors in Infrastructure (3.0 cr)
CEGE 5417 - Structural Engineering Design of Wood Buildings (3.0 cr)
CEGE 5511 - Urban Hydrology and Water Quality (4.0 cr)
CEGE 5512 - Stochastic Ecohydrology (3.0 cr)
CEGE 5513 - Energy Conversion from Wind, Hydro and Solar Resources (3.0 cr)
CEGE 5514 -Granular Physics with Environmental and Engineering Applications (4.0 cr)
CEGE 5515 - Remote Sensing of Environment and Water Resources (3.0 cr)
CEGE 5541 - Environmental Water Chemistry (3.0 cr)
CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
CEGE 5543 - Introductory Environmental Fluid Mechanics (4.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr)
CEGE 5552 - Environmental Microbiology Laboratory (1.0 cr)
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<td>CEGE 8508</td>
<td>Ecological Fluid Mechanics (4.0 cr)</td>
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<tr>
<td>CEGE 8511</td>
<td>Mechanics of Sediment Transport (3.0 cr)</td>
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<tr>
<td>CEGE 8521</td>
<td>The Atmospheric Boundary Layer (4.0 cr)</td>
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<tr>
<td>CEGE 8541</td>
<td>Aquatic Chemistry (3.0 cr)</td>
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<tr>
<td>CEGE 8542</td>
<td>Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)</td>
<td></td>
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<tr>
<td>CEGE 8551</td>
<td>Environmental Microbiology: Molecular Theory and Methods (3.0 cr)</td>
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<tr>
<td>CEGE 8561</td>
<td>Analysis and Modeling of Aquatic Environments I (3.0 cr)</td>
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<tr>
<td>CEGE 8562</td>
<td>Analysis and Modeling of Aquatic Environments II (3.0 cr)</td>
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<tr>
<td>CEGE 8571</td>
<td>Hydraulic Measurements (3.0 cr)</td>
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<tr>
<td>CEGE 8572</td>
<td>Computational Environmental Fluid Dynamics (4.0 cr)</td>
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<tr>
<td>CEGE 8581</td>
<td>Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)</td>
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<tr>
<td>CEGE 8601</td>
<td>Introduction to Stream Restoration (3.0 cr)</td>
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</tr>
<tr>
<td>CEGE 8602</td>
<td>Stream Restoration Practice (2.0 cr)</td>
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</tr>
</tbody>
</table>

**Electives (0-24 credits)**

Select courses from the following as needed, in consultation with the advisor, to complete the 36 course credits required. Students
may complete one course from each of the following cross-listed pairs, but not both: PA 5231 or CEGE 5213; PA 5232 or CEGE 5212; WRS 8581 or CEGE 8581. Other courses can be selected with advisor and director of graduate studies approval.

AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
ARCH 5391 - Design and Representation with BIM (3.0 cr)
ARCH 5671 - Historic Preservation (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5513 - Watershed Engineering (3.0 cr)
BBE 5523 - Ecological Engineering Design (3.0 cr)
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BBE 5753 - Air Quality and Pollution Control Engineering (3.0 cr)
BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CHEM 4214 - Polymers (3.0 cr)
CHEM 4601 - Green Chemistry [ENV] (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EEB 5068 - Plant Physiological Ecology (3.0 cr)
EEB 5111 - Systems Engineering I (2.0 cr)
EEB 5513 - Systems Engineering II (4.0 cr)
IE 5111 - Systems Engineering I (4.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5553 - Simulation (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
ME 5229 - Finite Element Method for Computational Mechanics: Transient/Dynamic Applications (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8332 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)
PA 5233 - Sustainable Transportation (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PMB 4111 - Microbial Physiology and Diversity (3.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7482 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
WRS 5101 - Water Policy (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
  or CEGE 5213 - Transit Planning and Management (3.0 cr)
PA 5232 - Transportation Policy, Planning, and Deployment (3.0 cr)
  or CEGE 5212 - Transportation Policy, Planning, and Deployment (3.0 cr)
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
  or CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Thesis Credits (24 credits)**
Take 24 doctoral thesis credits after passing preliminary oral exam.
CEGE 8898 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Computer Science M.C.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612- 625-4002; fax: 612-625-0572)
Email: csgradmn@umn.edu
Website: https://cse.umn.edu/cs

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Computer Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master's of Computer Science (MCS) is a terminal, professionally focused coursework-only degree designed for working professionals seeking to boost their current career, or change course. The MCS graduate program core offers coursework from a broad spectrum of theoretical and applied computer science topics and incorporates elective coursework opportunities in nearly all areas of the field. Faculty members have expertise in areas such as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including Bioinformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation, and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have an undergraduate or graduate degree in a major with a substantial background in computer science and engineering.

Other requirements to be completed before admission:
The names and email addresses of three recommenders are required; they will be asked to upload their letters of recommendation to the University system. The department only accepts students for fall admission; the application deadline is March 1.

Special Application Requirements:
Applicants must:
- have an undergraduate or graduate degree in a major with a substantial background in computer science and engineering, and be a working professional in the computer science or closely related field in the United States.

Admission is for fall semester only. The application deadline is March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
Program Requirements

Plan C: Plan C requires 31 major credits and 0 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

CSCI courses applied to degree requirements must be taken A-F if the A-F grading basis is offered.

Application of the following courses to degree requirements is restricted to a maximum combined total of 3 credits: CSCI 5991, CSCI 5994, CSCI 8991, and/or CSCI 8994.

Required Coursework (16 credits)

Applications Course (3 credits)

Select 3 credits from the following in consultation with the advisor:
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5123 - Recommender Systems (3.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5471 - Modern Cryptography (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5551 - Introduction to Intelligent Robot Systems (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5563 - Multiview 3D Geometry in Computer Vision (3.0 cr)
- CSCI 5607 - Fundamentals of Computer Graphics 1 (3.0 cr)
- CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5611 - Animation & Planning in Games (3.0 cr)
- CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)

Architecture, Systems and Software Course (3 credits)

Select 3 credits from the following in consultation with the advisor:
- CSCI 5103 - Operating Systems (3.0 cr)
- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5161 - Introduction to Compilers (3.0 cr)
- CSCI 5204 - Advanced Computer Architecture (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
- CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
- CSCI 5802 - Software Engineering II (3.0 cr)
Theory and Algorithms Course (3 credits)
Select 3 credits from the following in consultation with the advisor:
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)

Colloquium (1 credit)
Take the following:
- CSCI 8970 - Computer Science Colloquium (1.0 cr)

Computer Science 8000-level Courses (6 credits)
Select 6 credits from the following in consultation with the advisor. CSCI 8980 can be taken multiple times if the topics are different.
- CSCI 8101 - Advanced Operating Systems (3.0 cr)
- CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- CSCI 8117 - Understanding the Social Web (3.0 cr)
- CSCI 8161 - Advanced Compiler Techniques (3.0 cr)
- CSCI 8205 - Parallel Computer Organization (3.0 cr)
- CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
- CSCI 8271 - Security and Privacy in Computing (3.0 cr)
- CSCI 8314 - Sparse Matrix Computations (3.0 cr)
- CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
- CSCI 8442 - Computational Geometry and Applications (3.0 cr)
- CSCI 8523 - AI for Earth: Monitoring Changes in the Environment via Deep Learning (3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)
- CSCI 8581 - Big Data in Astrophysics (4.0 cr)
- CSCI 8701 - Overview of Database Research (3.0 cr)
- CSCI 8715 - Spatial Data Science Research (3.0 cr)
- CSCI 8725 - Databases for Bioinformatics (3.0 cr)
- CSCI 8735 - Advanced Database Systems (3.0 cr)
- CSCI 8801 - Advanced Software Engineering (3.0 cr)
- CSCI 8880 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- CSCI 8891 - Independent Study (1.0 - 3.0 cr)
or CSCI 8994 - Directed Research in Computer Science (1.0 - 3.0 cr)

Electives (15 credits)
Select 15 credits from the following. Other courses may be chosen with advisor and director of graduate studies approval. CSCI 5980 can be taken multiple times if the topics are different.

Computer Science Electives
- CSCI 5103 - Operating Systems (3.0 cr)
- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5117 - Developing the Interactive Web (3.0 cr)
- CSCI 5123 - Recommender Systems (3.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
- CSCI 5161 - Introduction to Compilers (3.0 cr)
- CSCI 5204 - Advanced Computer Architecture (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5451 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)
- CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
- CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5563 - Multiview 3D Geometry in Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5611 - Animation & Planning in Games (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 5991 - Independent Study (1.0 - 3.0 cr)
CSCI 5994 - Directed Research (1.0 - 3.0 cr)
CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
CSCI 8271 - Security and Privacy in Computing (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8991 - Independent Study (1.0 - 3.0 cr)
CSCI 8994 - Directed Research in Computer Science (1.0 - 3.0 cr)
Other Electives
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 8411 - Advanced Dynamics (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)
CEGE 8211 - Theory of Traffic Flow (4.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5301 - VLSI Design Automation I (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5355 - Algorithmic Techniques for Scalable Many-core Computing (3.0 cr)
EE 5364 - Advanced Computer Architecture (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5373 - Data Modeling Using R (1.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5505 - Wireless Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5741 - Advanced Power Electronics (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8367 - Parallel Computer Organization (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
MATH 5075 - Mathematics of Options, Futures, and Derivative Securities I (4.0 cr)
MATH 5165 - Mathematical Logic I (4.0 cr)
MATH 5248 - Cryptology and Number Theory (4.0 cr)
MATH 5251 - Error-Correcting Codes, Finite Fields, Algebraic Curves (4.0 cr)
MATH 5335 - Geometry I (4.0 cr)
MATH 5385 - Introduction to Computational Algebraic Geometry (4.0 cr)
MATH 5447 - Theoretical Neuroscience (4.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction to Numerical Methods II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5654 - Prediction and Filtering (4.0 cr)
MATH 5705 - Enumerative Combinatorics (4.0 cr)
MATH 5707 - Graph Theory and Non-enumerative Combinatorics (4.0 cr)
MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
MATH 8211 - Commutative and Homological Algebra (3.0 cr)
MATH 8212 - Commutative and Homological Algebra (3.0 cr)
MATH 8253 - Algebraic Geometry (3.0 cr)
MATH 8254 - Algebraic Geometry (3.0 cr)
MATH 8270 - Topics in Algebraic Geometry (1.0 - 3.0 cr)
MATH 8301 - Manifolds and Topology (3.0 cr)
MATH 8302 - Manifolds and Topology (3.0 cr)
MATH 8306 - Algebraic Topology (3.0 cr)
MATH 8307 - Algebraic Topology (3.0 cr)
MATH 8365 - Riemannian Geometry (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8501 - Differential Equations and Dynamical Systems I (3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8891 - Independent Study (1.0 - 6.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 8253 - Computational Nanomechanics (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences : Biostabilization in Biomedicine, and Biotechnology (1.0 - 3.0 cr)
ME 8794 - Mechanical Engineering Research (1.0 - 4.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6421 - Predictive Analytics (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8101 - Theory of Statistics I (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8931 - Advanced Topics in Statistics (3.0 cr)
STAT 8932 - Advanced Topics in Statistics (3.0 cr)
STAT 8933 - Advanced Topics in Statistics (3.0 cr)
Twin Cities Campus
Computer Science M.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: csgradmn@umn.edu
Website: https://cse.umn.edu/cs

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Computer Science MS degree offers coursework from across a broad spectrum of theoretical and applied computer science and combines research opportunities in nearly all areas of the field. The graduate program’s faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields. Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including bioinformatics and computational biology, health informatics, cognitive science, scientific computation, and human factors and ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A 4-year or equivalent undergraduate degree from an accredited university in any major with a substantial background in computer science is required; a computer science major is preferred.

Other requirements to be completed before admission:
Plan C applicants: Include a statement regarding long-term goals within industry.

International applicants interested in a teaching assistantship position must score at least 23 in both the speaking and writing portion of the TOEFL or equivalent test.

Special Application Requirements:
The program requires all applicants to complete the University’s online application and to include the names and email addresses of three recommenders.

Students are accepted for fall admission only. The application deadline is March 1. The GRE test is not required and will not be accepted as part of the application.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
IELTS
- Total Score: 6.5
- Reading Score: 6.5
- Writing Score: 6.5

MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 21 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 31 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project, completed in conjunction with CSCI 8760, demonstrates the student’s familiarity with the tools of research, the capability to work independently, and the ability to effectively relate their results to their committee. A written report describing the Plan B project must be approved by the advisor.

Plan C: Plan C requires 31 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Plan C students must complete a minimum of 100 hours of course-based project work, a written research report, and an oral presentation within CSCI courses taken for graduate credit.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

CSCI courses applied to degree requirements must be taken A-F if the A-F grading basis is offered.

Application of the following courses to degree requirements is restricted to a maximum combined total of 3 credits: CSCI 5991, CSCI 5994, CSCI 8991, and/or CSCI 8994.

Required Coursework (13 to 16 credits)

Breadth Courses (9 credits)

Applications Course (3 credits)
Select 3 credits from the following in consultation with the advisor:

CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5123 - Recommender Systems (3.0 cr)
CSCI 5125 - Collaborative and Social Computing (3.0 cr)
CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5471 - Modern Cryptography (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5563 - Multiview 3D Geometry in Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics 1 (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5611 - Animation & Planning in Games (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)

Architecture, Systems and Software Course (3 credits)
Select 3 credits from the following in consultation with the advisor:

CSCI 5103 - Operating Systems (3.0 cr)
CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
CSCI 5106 - Programming Languages (3.0 cr)
CSCI 5161 - Introduction to Compilers (3.0 cr)
CSCI 5204 - Advanced Computer Architecture (3.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)

**Theory and Algorithms Course (3 credits)**

Select 3 credits from the following in consultation with the advisor:

CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)

**Colloquium (1 credit)**

Take the following:

CSCI 8970 - Computer Science Colloquium (1.0 cr)

**Computer Science 8000-level Courses (3 to 6 credits)**

Plan A and Plan C students select 6 credits, and Plan B students select 3 credits from the following in consultation with the advisor. CSCI 8980 can be taken multiple times if the topics are different.

CSCI 8101 - Advanced Operating Systems (3.0 cr)
CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
CSCI 8117 - Understanding the Social Web (3.0 cr)
CSCI 8161 - Advanced Compiler Techniques (3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
CSCI 8271 - Security and Privacy in Computing (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
CSCI 8442 - Computational Geometry and Applications (3.0 cr)
CSCI 8523 - AI for Earth: Monitoring Changes in the Environment via Deep Learning (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8581 - Big Data in Astrophysics (4.0 cr)
CSCI 8701 - Overview of Database Research (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8801 - Advanced Software Engineering (3.0 cr)
CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8991 - Independent Study (1.0 - 3.0 cr)
or CSCI 8994 - Directed Research in Computer Science (1.0 - 3.0 cr)

**Electives (5-15 credits)**

Plan A students select 5 credits, and Plan B and Plan C students select 15 credits from the following in consultation with the advisor to meet the minimum number of course credits required. Other courses may be applied to this requirement with director of graduate studies approval. CSCI 5980 can be taken multiple times if the topics are different.

**Computer Science Electives**

CSCI 5103 - Operating Systems (3.0 cr)
CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
CSCI 5106 - Programming Languages (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5117 - Developing the Interactive Web (3.0 cr)
CSCI 5123 - Recommender Systems (3.0 cr)
CSCI 5125 - Collaborative and Social Computing (3.0 cr)
CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
CSCI 5161 - Introduction to Compilers (3.0 cr)

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Information current as of November 07, 2022
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CSCI 5204</td>
<td>Advanced Computer Architecture (3.0 cr)</td>
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<tr>
<td>CSCI 5211</td>
<td>Data Communications and Computer Networks (3.0 cr)</td>
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<tr>
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<td>CSCI 5451</td>
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<td>Computational Techniques for Genomics (3.0 cr)</td>
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<td>Introduction to Intelligent Robotic Systems (3.0 cr)</td>
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<td>Sensing and Estimation in Robotics (3.0 cr)</td>
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<td>Virtual Reality and 3D Interaction (3.0 cr)</td>
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<td>Principles of Database Systems (3.0 cr)</td>
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<td>CSCI 5980</td>
<td>Special Topics in Computer Science (1.0 - 3.0 cr)</td>
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<td>Independent Study (1.0 - 3.0 cr)</td>
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<tr>
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<td>CSCI 8205</td>
<td>Parallel Computer Organization (3.0 cr)</td>
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<td>CSCI 8211</td>
<td>Advanced Computer Networks and Their Applications (3.0 cr)</td>
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<td>CSCI 8271</td>
<td>Security and Privacy in Computing (3.0 cr)</td>
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<td>CSCI 8363</td>
<td>Numerical Linear Algebra in Data Exploration (3.0 cr)</td>
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<tr>
<td>CSCI 8551</td>
<td>Intelligent Agents (3.0 cr)</td>
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<td>CSCI 8715</td>
<td>Spatial Data Science Research (3.0 cr)</td>
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<td>Advanced Database Systems (3.0 cr)</td>
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<td>CSCI 8991</td>
<td>Independent Study (1.0 - 3.0 cr)</td>
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<tr>
<td>CSCI 8994</td>
<td>Directed Research in Computer Science (1.0 - 3.0 cr)</td>
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Other Electives

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<tr>
<th>Course Code</th>
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<tr>
<td>AEM 5401</td>
<td>Intermediate Dynamics (3.0 cr)</td>
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<td>AEM 5451</td>
<td>Optimal Estimation (3.0 cr)</td>
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<td>AEM 8411</td>
<td>Advanced Dynamics (3.0 cr)</td>
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<td>AEM 8423</td>
<td>Convex Optimization Methods in Control (3.0 cr)</td>
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<td>BMEN 5001</td>
<td>Advanced Biomaterials (3.0 cr)</td>
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<td>BMEN 5201</td>
<td>Advanced Biomechanics (3.0 cr)</td>
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<td>BMEN 5701</td>
<td>Cancer Bioengineering (3.0 cr)</td>
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<td>BMEN 8151</td>
<td>Biomedical Electronics and Implantable Microsystems (3.0 cr)</td>
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<td>CEGE 8211</td>
<td>Theory of Traffic Flow (4.0 cr)</td>
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<td>EE 5231</td>
<td>Linear Systems and Optimal Control (3.0 cr)</td>
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<td>EE 5235</td>
<td>Robust Control System Design (3.0 cr)</td>
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<td>EE 5239</td>
<td>Introduction to Nonlinear Optimization (3.0 cr)</td>
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<td>EE 5251</td>
<td>Optimal Filtering and Estimation (3.0 cr)</td>
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<td>EE 5301</td>
<td>VLSI Design Automation I (3.0 cr)</td>
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<td>EE 5333</td>
<td>Analog Integrated Circuit Design (3.0 cr)</td>
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<td>EE 5351</td>
<td>Applied Parallel Programming (3.0 cr)</td>
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<td>EE 5355</td>
<td>Algorithmic Techniques for Scalable Many-core Computing (3.0 cr)</td>
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<td>EE 5364</td>
<td>Advanced Computer Architecture (3.0 cr)</td>
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<td>EE 5371</td>
<td>Computer Systems Performance Measurement and Evaluation (3.0 cr)</td>
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<td>EE 5373</td>
<td>Data Modeling Using R (1.0 cr)</td>
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<td>EE 5393</td>
<td>Circuits, Computation, and Biology (3.0 cr)</td>
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<td>EE 5505</td>
<td>Wireless Communication (3.0 cr)</td>
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<tr>
<td>EE 5531</td>
<td>Probability and Stochastic Processes (3.0 cr)</td>
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</table>
Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
CSCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Project Credits (3 credits)
Take the following:
CSCI 8760 - Plan B Project (3.0 cr)

-OR-

Plan C
At least 2 courses from the lists above, selected in consultation with the advisor to meet the 31-credit requirement, must be project courses. Possible courses include the following:

Project Coursework
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5117 - Developing the Interactive Web (3.0 cr)
CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
CSCI 5204 - Advanced Computer Architecture (3.0 cr)
CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5471 - Modern Cryptography (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5611 - Animation & Planning in Games (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 5991 - Independent Study (1.0 - 3.0 cr)
CSCI 5994 - Directed Research (1.0 - 3.0 cr)
CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
CSCI 8442 - Computational Geometry and Applications (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8991 - Independent Study (1.0 - 3.0 cr)
CSCI 8994 - Directed Research in Computer Science (1.0 - 3.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Integrated B.S.Comp.Sc./M.S. - Computer Science
The Department of Computer Science and Engineering offers an integrated bachelor of science in computer science (BCompSc) and master of science (MS). The integrated BCompSc/MS program offers students the opportunity to earn both degrees in five years. The combined program offers several advantages: streamlined admissions from the undergraduate to the graduate program; flexibility in fulfilling required courses for both degrees during the senior year; eligibility for graduate assistantships and fellowships; and financial savings by allowing up to 16 graduate credits to be completed at the undergraduate tuition rate. Eligible applicants must be University undergraduates who have completed a majority of the required upper division courses for their BCompSc degree, with a minimum
technical GPA of 3.50 or a strong recommendation from a Computer Science and Engineering faculty member.

Both the BSCompSc and MS degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Students must spend a minimum of two semesters as a graduate student after the completion of their undergraduate degree.

Integrated B.Comp.E./M.S. - Computer Science
The Department of Computer Science and Engineering offers an integrated bachelor of computer engineering (BCompE) and master of science (MS). Benefits, eligibility requirements, and degree-completion requirements outlined for the integrated BSCompSc/MS program also apply to the BCompE/MS.

Integrated B.A.-Computer Science /M.S. - Computer Science
The Department of Computer Science and Engineering offers an integrated bachelor of arts (BA) and master of science (MS) in computer science. Benefits, eligibility requirements, and degree-completion requirements outlined for the integrated BSCompSc/MS program also apply to the BA/MS.
Twin Cities Campus

Computer Science Minor
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: csgradmn@umn.edu
Website: https://cse.umn.edu/cs

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science and combines research opportunities in nearly all areas of the field. The graduate program’s faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including Bioinformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation, and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Computer Science director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Only one 4xxx-level course may be applied to minor field course requirements.

Coursework applied to the minor that is offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for minor field coursework is 3.00 for masters students and 3.25 for doctoral students.

Minor Coursework (9 to 12 credits)
Masters students select 9 credits, and doctoral students select 12 credits from the following in consultation with the Computer Science graduate program coordinator. Advanced Computer Science Courses require students to complete at least 1 8xxx-level course or 1 5xxx-level course with a 5xxx-level prerequisite. Other courses may be applied to the minor with approval of the Computer Science graduate program coordinator.

Advanced Computer Science Courses (3 credits)
Select at least 3 credits from the following in consultation with the Computer Science graduate program coordinator:

- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5161 - Introduction to Compilers (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)
- CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
- CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
- CSCI 5802 - Software Engineering II (3.0 cr)
- CSCI 8101 - Advanced Operating Systems (3.0 cr)
- CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- CSCI 8117 - Understanding the Social Web (3.0 cr)
- CSCI 8161 - Advanced Compiler Techniques (3.0 cr)
- CSCI 8205 - Parallel Computer Organization (3.0 cr)
- CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
- CSCI 8271 - Security and Privacy in Computing (3.0 cr)
- CSCI 8314 - Sparse Matrix Computations (3.0 cr)
- CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
- CSCI 8442 - Computational Geometry and Applications (3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)
- CSCI 8581 - Big Data in Astrophysics (4.0 cr)
- CSCI 8701 - Overview of Database Research (3.0 cr)
- CSCI 8715 - Spatial Data Science Research (3.0 cr)
- CSCI 8725 - Databases for Bioinformatics (3.0 cr)
- CSCI 8735 - Advanced Database Systems (3.0 cr)
- CSCI 8801 - Advanced Software Engineering (3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)

Masters students select credits from the following as needed to complete the 9-credit requirement for the minor, and doctoral students select credits as needed to complete the 12 non-colloquium credits required. Courses are selected in consultation with the Computer Science graduate program coordinator. Other courses can be chosen with Computer Science graduate program coordinator approval.
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral

Colloquium (1 credit)
Doctoral students take the following to complete the 13-credit requirement:
CSCI 8970 - Computer Science Colloquium (1.0 cr)
Twin Cities Campus

Computer Science Ph.D.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: csadmit@umn.edu
Website: https://cse.umn.edu/cs

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 55
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Computer Science PhD offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; machine learning; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields. Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including Bioinformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation, and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.45.

A degree in any major with a substantial background in computer science is required; a computer science major is preferred.

Other requirements to be completed before admission:
Scores from the General (Aptitude) Test of the GRE are not required and will not be accepted as part of the application.

Students are accepted for fall admission only. The application deadline is January 5. Students seeking financial aid must apply by December 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements
16 to 25 credits are required in the major.
6 to 15 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.45 is required for students to remain in good standing.

CSCI courses applied to degree requirements must be taken A-F if the A-F grading basis is offered.

Application of the following courses to degree requirements is restricted to a maximum combined total of 6 credits: CSCI 5991, CSCI 5994, CSCI 8991, and/or CSCI 8994.

Thesis Proposal Examination: All doctoral students must prepare and present an overview of their research topic and objectives after attaining doctoral candidacy, but no later than 6 months before the final oral examination.

Required Coursework (16 credits)

Breadth Courses (15 credits)
Select at least 3 credits from each of the 3 subject areas for a total of 9 credits, plus 6 credits from any of the subject areas, for a total of 15 credits. Courses are selected in consultation with the advisor.

Applications Courses
Select at least 3 credits from the following in consultation with the advisor:
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5123 - Recommender Systems (3.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5127W - Embodied Computing: Design & Prototyping [WI] (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5471 - Modern Cryptography (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5563 - Multiview 3D Geometry in Computer Vision (3.0 cr)
- CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
- CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5611 - Animation & Planning in Games (3.0 cr)
- CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)

Architecture, Systems and Software Courses
Select at least 3 credits from the following in consultation with the advisor:

- CSCI 5103 - Operating Systems (3.0 cr)
- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5161 - Introduction to Compilers (3.0 cr)
- CSCI 5204 - Advanced Computer Architecture (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
- CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
- CSCI 5802 - Software Engineering II (3.0 cr)

Theory and Algorithms Courses
Select at least 3 credits from the following in consultation with the advisor:
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)

**Colloquium (1 credit)**
Take the following:
CSCI 8970 - Computer Science Colloquium (1.0 cr)

**Additional Coursework (15 credits)**

**Outside Coursework (6 to 15 credits)**
Select at least 6 credits from the following in consultation with the advisor:

- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 8411 - Advanced Dynamics (3.0 cr)
- AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)
- CEGE 8211 - Theory of Traffic Flow (4.0 cr)
- EE 5231 - Linear Systems and Optimal Control (3.0 cr)
- EE 5235 - Robust Control System Design (3.0 cr)
- EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
- EE 5251 - Optimal Filtering and Estimation (3.0 cr)
- EE 5301 - VLSI Design Automation I (3.0 cr)
- EE 5333 - Analog Integrated Circuit Design (3.0 cr)
- EE 5351 - Applied Parallel Programming (3.0 cr)
- EE 5355 - Algorithmic Techniques for Scalable Many-core Computing (3.0 cr)
- EE 5364 - Advanced Computer Architecture (3.0 cr)
- EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
- EE 5373 - Data Modeling Using R (1.0 cr)
- EE 5393 - Circuits, Computation, and Biology (3.0 cr)
- EE 5505 - Wireless Communication (3.0 cr)
- EE 5531 - Probability and Stochastic Processes (3.0 cr)
- EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
- EE 5581 - Information Theory and Coding (3.0 cr)
- EE 5585 - Data Compression (3.0 cr)
- EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
- EE 5741 - Advanced Power Electronics (3.0 cr)
- EE 8231 - Optimization Theory (3.0 cr)
- EE 8367 - Parallel Computer Organization (3.0 cr)
- EE 8581 - Detection and Estimation Theory (3.0 cr)
- EE 8591 - Predictive Learning from Data (3.0 cr)
- IE 5531 - Engineering Optimization I (4.0 cr)
- IE 5532 - Stochastic Models (4.0 cr)
- MATH 5075 - Mathematics of Options, Futures, and Derivative Securities I (4.0 cr)
- MATH 5165 - Mathematical Logic I (4.0 cr)
- MATH 5248 - Cryptology and Number Theory (4.0 cr)
- MATH 5251 - Error-Correcting Codes, Finite Fields, Algebraic Curves (4.0 cr)
- MATH 5335 - Geometry I (4.0 cr)
- MATH 5385 - Introduction to Computational Algebraic Geometry (4.0 cr)
- MATH 5447 - Theoretical Neuroscience (4.0 cr)
- MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
- MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
- MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
- MATH 5561 - Basic Theory of Probability and Statistics (4.0 cr)
- MATH 5562 - Introduction to Stochastic Processes (4.0 cr)
- MATH 5564 - Prediction and Filtering (4.0 cr)
- MATH 5705 - Enumerative Combinatorics (4.0 cr)
- MATH 5707 - Graph Theory and Non-enumerative Combinatorics (4.0 cr)
- MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
- MATH 8211 - Commutative and Homological Algebra (3.0 cr)
- MATH 8212 - Commutative and Homological Algebra (3.0 cr)
- MATH 8253 - Algebraic Geometry (3.0 cr)
MATH 8254 - Algebraic Geometry (3.0 cr)
MATH 8270 - Topics in Algebraic Geometry (1.0 - 3.0 cr)
MATH 8301 - Manifolds and Topology (3.0 cr)
MATH 8302 - Manifolds and Topology (3.0 cr)
MATH 8306 - Algebraic Topology (3.0 cr)
MATH 8307 - Algebraic Topology (3.0 cr)
MATH 8365 - Riemannian Geometry (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8501 - Differential Equations and Dynamical Systems I (3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 8253 - Computational Nanomechanics (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences: Biostabilization in Biomedicine, and Biotechnology (1.0 - 3.0 cr)
ME 8794 - Mechanical Engineering Research (1.0 - 4.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
MSBA 6421 - Predictive Analytics (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8931 - Advanced Topics in Statistics (3.0 cr)
STAT 8932 - Advanced Topics in Statistics (3.0 cr)
STAT 8933 - Advanced Topics in Statistics (3.0 cr)

Computer Science Electives (0 to 9 credits)
Select credits as needed, in consultation with the advisor, to complete the 31 course credits required. CSCI 5980 and CSCI 8980 can be taken multiple times if the topics are different. Students are encouraged, but not required, to take CSCI 8001 and 8002.

CSCI 5103 - Operating Systems (3.0 cr)
CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
CSCI 5106 - Programming Languages (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5117 - Developing the Interactive Web (3.0 cr)
CSCI 5123 - Recommender Systems (3.0 cr)
CSCI 5125 - Collaborative and Social Computing (3.0 cr)
CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
CSCI 5161 - Introduction to Compilers (3.0 cr)
CSCI 5204 - Advanced Computer Architecture (3.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5471 - Modern Cryptography (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5563 - Multiview 3D Geometry in Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5611 - Animation & Planning in Games (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 5991 - Independent Study (1.0 - 3.0 cr)
CSCI 5994 - Directed Research (1.0 - 3.0 cr)
CSCI 8001 - Introduction to Research in Computer Science I (1.0 cr)
CSCI 8002 - Introduction to Research in Computer Science, II (2.0 cr)
CSCI 8101 - Advanced Operating Systems (3.0 cr)
CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
CSCI 8117 - Understanding the Social Web (3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
CSCI 8217 - Security and Privacy in Computing (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
CSCI 8442 - Computational Geometry and Applications (3.0 cr)
CSCI 8523 - AI for Earth: Monitoring Changes in the Environment via Deep Learning (3.0 cr)
CSCI 8551 - Intelligent Agents (3.0 cr)
CSCI 8581 - Big Data in Astrophysics (4.0 cr)
CSCI 8701 - Overview of Database Research (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8801 - Advanced Software Engineering (3.0 cr)
CSCI 8990 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8991 - Independent Study (1.0 - 3.0 cr)
CSCI 8994 - Directed Research in Computer Science (1.0 - 3.0 cr)

**Thesis Credits (24 credits)**

Take 24 doctoral thesis credits after passing preliminary oral exam.

CSCI 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Cyber Security Minor
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
(612-624-5474; fax: 612-624-7510)
Email: msst@umn.edu
Website: https://cse.umn.edu/tli

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Cyber Security minor integrates the fields of technology, security, and management, to provide students with the skills and insights to assume a leadership role in cyber security, or continue their field of study with a focus on cyber security and its role in organizations.

The curriculum applies fundamental concepts of business management, organizational leadership, and risk management techniques and strategies, each as applied in the context of cyber security, to empower engineering, technology, and business professionals to adapt and lead in the emerging field of cyber security. Each class will include exercises that inform students on those cyber security topics, and give them an opportunity to practice the fundamental skills of communications, teamwork, and project management.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Cyber Security director of graduate studies regarding feasibility and requirements.

Students not currently enrolled in the Master of Science in Security Technologies (MSST) program must be approved for the minor by the Director of Graduate Studies, and may be asked to complete a background check prior to receiving registration permission for ST-designated courses.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Required Courses (6 credits)
Take the following courses in sequence:
ST 8661 - Securing Cyberspace (Fundamentals) (3.0 cr)
ST 8662 - Securing Cyberspace - Advanced (3.0 cr)

Elective Courses (2-6 credits)
Master's students select at least 2 credits, and doctoral students select at least 6 credits in consultation with the Cyber Security director of graduate studies to complete the minimum credit requirement. Other courses may be applied to the minor with approval of the Cyber Security director of graduate studies.
ST 8113 - Information and Cyber Security (2.0 cr)
ST 8513 - Cyber Threat Intelligence (2.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5471 - Modern Cryptography (3.0 cr)
CSCI 8271 - Security and Privacy in Computing (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Data Science for Chemical Engineering and Materials Science M.S.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax 612-626-7246)
Email: cemsds@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. in Data Science for Chemical Engineering and Materials Science degree bridges disciplinary expertise in chemical engineering and materials science with data and computational science. It aims to educate the next generation of chemical engineers and materials scientists that will be able to work seamlessly with digital technologies.

The program core provides fundamental knowledge of statistical and data analysis, machine learning, and artificial intelligence, as well as their application in chemical, biological, and materials science and engineering problems. Elective courses allow students to specialize in artificial intelligence, high performance computing, systems engineering, automation and robotics, or data analytics, depending on their specific interests and needs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Baccalaureate degree in Chemical Engineering, Materials Science or related field.

Other requirements to be completed before admission:
The undergraduate degree must include two semesters of calculus and one semester of the following: multivariable calculus; linear algebra/differential equations; statistics; programming in languages such as C++ or Python; and algorithms and data structures. Exceptions or substitutions will be considered on an individual basis.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is January 15. Applications received after that date will be considered on an individual basis only under exceptional circumstances.

International applicants must submit score(s) from one of the following tests:
- TOEFL

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written and oral. A capstone project is
required.

**Capstone Project:** Students complete a capstone project for a minimum of 3 credits under the supervision of faculty or in collaboration with industry advisors.

**Plan C:** Plan C requires 30 major credits and 0 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Approval of advisor and the director of graduate studies is required to apply 4xxx courses to degree requirements.

**Core Courses (19 credits)**

Students are strongly recommended to take CSci 5521 before CHEN/MATS 5801. Students may complete one course from each of the following cross-listed pairs, but not both: CHEN/MATS 5801, 5802, 8201. Other courses may be selected with advisor and director of graduate studies approval.

- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- CHEN 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
  - or MATS 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
- CHEN 5802 - Applied Machine Learning in Chemical Engineering and Materials Science (3.0 cr)
  - or MATS 5802 - Machine Learning for Chemical Sciences and Engineering (3.0 cr)
- CHEN 8201 - Applied Math (3.0 cr)
  - or MATS 8201 - Applied Math (3.0 cr)

**Electives (8 to 11 credits)**

Plan B students select at least 8 credits and Plan C students select at least 11 credits from the following. Other courses may be selected with advisor and director of graduate studies approval.

**Major Electives**

Students may complete one course from each of the following cross-listed pairs, but not both: CHEN/MATS 5771, 5803, 8001, 8221, 8301.

Students who do not have an undergraduate degree in chemical engineering or materials science must take two courses from the following list, in consultation with the director of graduate studies:

- CHEN 5751 - Biochemical Engineering (3.0 cr)
- CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
- CHEN 8101 - Fluid Mechanics (3.0 cr)
- CHEN 8102 - Introduction to Rheology (2.0 cr)
- CHEN 8104 - Coating Process Fundamentals (2.0 cr)
- CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
- MATS 5517 - Microscopy of Materials (3.0 cr)
- MATS 5531 - Electrochemical Engineering (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- MATS 8004 - Mechanical Properties (3.0 cr)
- MATS 8217 - Transmission Electron Microscopy (3.0 cr)
- CHEN 5771 - Colloids and Dispersions (3.0 cr)
  - or MATS 5771 - Colloids and Dispersions (3.0 cr)
- CHEN 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
  - or MATS 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
- CHEN 8001 - Structure and Symmetry of Materials (3.0 cr)
  - or MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)
  - or MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
or MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)

Outside Electives
Students must select at least one course from this list. Students may complete one course from each of the following cross listed pairs, but not both: AST 5731/STAT 5731, CSCI 8205/EE 8367, MATH 5651/STAT 5101, PUBH 8475/STAT 8056.

CSCI 5103 - Operating Systems (3.0 cr)
CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8581 - Big Data in Astrophysics (4.0 cr)
CSCI 8701 - Overview of Database Research (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8801 - Advanced Software Engineering (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5271 - Robot Vision (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5355 - Algorithmic Techniques for Scalable Many-core Computing (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5389 - Introduction to Predictive Learning (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7407 - Analysis of Categorical Data (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7460 - Advanced Statistical Computing (3.0 cr)
PUBH 7474 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7481 - Methods for Causal Inference (3.0 cr)
PUBH 8401 - Linear Models (3.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
Plan Options

Plan B
Project Credits (3 credits)
Select 3 credits for the capstone project, in consultation with the advisor, from the following list:
CHEN 8993 - Directed Study (1.0 - 12.0 cr)
CHEN 8994 - Directed Research (1.0 - 12.0 cr)
MATS 8993 - Directed Study (1.0 - 12.0 cr)
MATS 8994 - Directed Research (1.0 - 12.0 cr)
Twin Cities Campus
Data Science in Astrophysics Minor
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
115 Union St SE, Office 321, Minneapolis, MN 55455 (Phone: 612-624-7886).
Email: nrtmma_info@umn.edu
Website: https://dsmma.umn.edu/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in Data Science in Astrophysics is designed to be interdisciplinary and integrates data science (statistics, data processing, artificial intelligence) with the field of astrophysics. Students pursuing the minor will receive the training needed to advance the field of astrophysics, while simultaneously preparing to be successful professionals and leaders in the modern data-driven workforce.

The curriculum covers the fundamental concepts in statistics, data processing and data management, as well as the modern machine learning and deep learning techniques needed for analyzing the ever-increasing astrophysics data-sets. Students will have opportunities to conduct frontier research projects using modern astrophysics data-sets, and will work in interdisciplinary teams mentored by interdisciplinary faculty. They will also have opportunities to develop their professional skills, such as communications and leadership.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Data Science in Astrophysics director of graduate studies regarding feasibility and requirements. A background in science, engineering, or statistics is preferred.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of C earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Required courses (8 credits)
Astrostatistics (4 credits)
All students select 1 of the following in consultation with the Data Science in Astrophysics director of graduate studies.
AST 5731 - Bayesian Astrostatistics (4.0 cr)
or STAT 5731 - Bayesian Astrostatistics (4.0 cr)
Big Data (4 credits)
All students select 1 of the following in consultation with the Data Science in Astrophysics director of graduate studies.

AST 8581 - Big Data in Astrophysics (4.0 cr)
or CSCI 8581 - Big Data in Astrophysics (4.0 cr)
or PHYS 8581 - Big Data in Astrophysics (4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral

Electives (4 credits)
Doctoral students select 4 additional credits in consultation with the Data Science in Astrophysics director of graduate studies to meet the 12-credit minimum.

AST 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
AST 8001 - Radiative Processes in Astrophysics (4.0 cr)
AST 8011 - High Energy Astrophysics (4.0 cr)
AST 8990 - Research in Astronomy and Astrophysics (1.0 - 4.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
PHYS 8994 - Research in Physics (1.0 - 12.0 cr)
PUBH 7460 - Advanced Statistical Computing (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
Twin Cities Campus
Data Science M.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Data Science Graduate Program, Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572).
Email: cgadmn@umn.edu
Website: https://cse.umn.edu/datascience

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Data Science MS program provides a strong foundation in the science of Big Data and its analysis by gathering in a single program the knowledge, expertise, and educational assets in data collection and management, data analytics, scalable data-driven pattern discovery, and the fundamental concepts behind these methods.

Students who graduate from this regular 2-year master's program will learn the state-of-the-art methods for treating Big Data, be exposed to the cutting-edge methods and theory forming the basis for the next generation of Big Data technology, and will complete a project demonstrating that they can use the fundamental concepts to design innovative methods for new application areas arising from business, government, security, medicine, biology, physical sciences, and the environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited college or university in computer science, math, statistics, engineering, natural sciences, or a related field.

Other requirements to be completed before admission:
The undergraduate degree must include statistics, calculus, multivariable calculus, linear algebra, and mathematical software environments such as Matlab or R or the equivalent, programming languages such as C, C++, Java, programming experience including algorithms and data structures normally taught in beginning computer science courses either as part of the undergraduate degree or subsequent work experience.

Special Application Requirements:
The application deadline is March 1.

Applicants are only considered for fall admission and decisions are made after all applications are received following the close of the application cycle.

GRE test scores are not required, but are recommended for those applying from international institutions. If submitted, the GRE is only one of many factors considered for admission, and no score will guarantee or preclude admission. Applications without the GRE will be considered based on the material submitted.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
IELTS
- Total Score: 6.5
MELAB
- Part 1 (Composition) score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

Program Requirements
Plan B: Plan B requires 31 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Students must complete 3 credit hours of DSCI 8760 (capstone project) under the supervision of a faculty member.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

At least 3 8xxx-level credits, either from an emphasis or an elective, are required.

Complete a presentation at the Data Science Poster Fair for Plan B project as part of degree requirements in the semester of anticipated graduation. Consult with the advisor on an appropriate timeline to present.

Statistics (6 credits)

Statistics Tier I (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5511 - Time Series Analysis (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8101 - Theory of Statistics I (3.0 cr)

Statistics Tier II (0 to 3 credits)
Select credits from the following, in consultation with the advisor, as needed to meet the 6-credit Statistics requirement:
- EE 5531 - Probability and Stochastic Processes (3.0 cr)
- PUBH 7405 - Biostatistical Inference I (4.0 cr)
- PUBH 7406 - Biostatistical Inference II (3.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7460 - Advanced Statistical Computing (3.0 cr)
- PUBH 7485 - Methods for Causal Inference (3.0 cr)
- PUBH 8401 - Linear Models (3.0 cr)
- PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- STAT 5052 - Statistical and Machine Learning (3.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 5701 - Statistical Computing (3.0 cr)
STAT 8112 - Mathematical Statistics II (3.0 cr)
AST 5731 - Bayesian Astrostatistics (4.0 cr)
or STAT 5731 - Bayesian Astrostatistics (4.0 cr)

Algorithmics (6 credits)
Algorithmics Tier I (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor. Students may complete PUBH 8475 or STAT 8056 but not both.
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
or STAT 8056 - Statistical Learning and Data Mining (3.0 cr)

Algorithmics Tier II (0 to 3 credits)
Select credits from the following, in consultation with the advisor, as needed to meet the 6-credit Algorithmics requirement:
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8581 - Big Data in Astrophysics (4.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5389 - Introduction to Predictive Learning (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)

Infrastructure and Large-Scale Computing (6 credits)
Infrastructure and Large-Scale Computing Tier I (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:
CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
or EE 8367 - Parallel Computer Organization (3.0 cr)

Infrastructure and Large-Scale Computing Tier II (0 to 3 credits)
Select credits from the following, in consultation with the advisor, as needed to complete the 6-credit Infrastructure and Large-Scale Computing requirement.
CSCI 5103 - Operating Systems (3.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
CSCI 8701 - Overview of Database Research (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8801 - Advanced Software Engineering (3.0 cr)
EE 5355 - Algorithmic Techniques for Scalable Many-core Computing (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)

**Electives (9 credits)**
Select 9 credits from the following in consultation with the advisor. Courses from above lists that are not applied to other requirements can be selected with advisor approval. Other electives may be selected in consultation with the advisor and director of graduate studies. If 3 credits of DSCI 8760 have already been taken in a semester an additional 3 credits in a subsequent semester can be used towards elective coursework after consultation with the advisor.

- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5123 - Recommender Systems (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5541 - Natural Language Processing (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
- CSCI 8271 - Security and Privacy in Computing (3.0 cr)
- CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- DSCI 8760 - Data Science M.S. Plan B Project (3.0 cr)
- EE 5393 - Circuits, Computation, and Biology (3.0 cr)
- IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
- IE 8535 - Introduction to Network Science (4.0 cr)
- MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
- PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)

**Research Colloquium (1 credit)**
Select 1 of the following in consultation with the advisor:

- CSCI 8970 - Computer Science Colloquium (1.0 cr)
- or DSCI 8970 - Data Science M.S. Colloquium (1.0 cr)

**Capstone Course (3 credits)**
Take the following in consultation with the advisor:

- DSCI 8760 - Data Science M.S. Plan B Project (3.0 cr)
Twin Cities Campus
Data Science Minor
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Data Science Graduate Program, Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572).
Email: csgradmn@umn.edu
Website: https://cse.umn.edu/datascience

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Data Science minor provides a strong foundation in the science of Big Data and its analysis by gathering together the knowledge, expertise, and educational assets in data collection and management, data analytics, scalable data-driven pattern discovery, and the fundamental concepts behind these methods. Students completing this minor will learn the state-of-the-art methods for treating Big Data and be exposed to the cutting-edge methods and theory forming the basis for the next generation of Big Data technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Data Science director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken at the University of Minnesota Twin Cities Campus; transfer coursework will not be accepted.

Minor coursework offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for the minor is 3.00.

Algorithmics (3 credits)
Select 3 credits from the following. Students may complete PUBH 8475 or STAT 8056 but not both.
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- EE 8591 - Predictive Learning from Data (3.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
- STAT 8056 - Statistical Learning and Data Mining (3.0 cr)
Statistics (3 credits)
Select 3 credits from the following:
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5511 - Time Series Analysis (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
- STAT 8102 - Theory of Statistics 2 (3.0 cr)
- MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
  or STAT 5101 - Theory of Statistics I (4.0 cr)

Infrastructure and Large-Scale Computing (3 credits)
Select 3 credits from the following:
- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
- EE 5351 - Applied Parallel Programming (3.0 cr)
  or EE 8367 - Parallel Computer Organization (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Coursework from the student’s home department cannot be applied as an elective.

Electives (3 credits)
Select 3 credits from the following to complete the 12-credit minimum for the doctoral minor. Coursework not used to satisfy course requirements for the 3 areas listed above can be applied to the elective requirement.
- AST 5731 - Bayesian Astrostatistics (4.0 cr)
- CSCI 5103 - Operating Systems (3.0 cr)
- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5123 - Recommender Systems (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)
- CSCI 5541 - Natural Language Processing (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
- CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
- CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 8102 - Foundations of Distributed Computing (3.0 cr)
CSCI 8205 - Parallel Computer Organization (3.0 cr)
CSCI 8271 - Security and Privacy in Computing (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
CSCI 8581 - Big Data in Astrophysics (4.0 cr)
CSCI 8701 - Overview of Database Research (3.0 cr)
CSCI 8715 - Spatial Data Science Research (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
CSCI 8735 - Advanced Database Systems (3.0 cr)
CSCI 8801 - Advanced Software Engineering (3.0 cr)
CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5355 - Algorithmic Techniques for Scalable Many-core Computing (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5389 - Introduction to Predictive Learning (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8367 - Parallel Computer Organization (3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8581 - Data Compression (3.0 cr)
IE 8591 - Predictive Learning from Data (3.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7407 - Analysis of Categorical Data (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7460 - Advanced Statistical Computing (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7485 - Methods for Causal Inference (3.0 cr)
PUBH 8401 - Linear Models (3.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
STAT 5052 - Statistical and Machine Learning (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 5731 - Bayesian Astrostatistics (4.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8112 - Mathematical Statistics II (3.0 cr)
Twin Cities Campus
Data Science Postbaccalaureate Certificate
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Data Science Graduate Program, Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572).
Email: csgradmn@umn.edu
Website: https://cse.umn.edu/datascience

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Data Science Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Data Science post-baccalaureate certificate program provides a strong foundation in the science of Big Data and its analysis by gathering in a single program the knowledge, expertise, and educational assets in data collection and management, data analytics, scalable data-driven pattern discovery, and the fundamental concepts behind these methods.

Students who graduate from this 2-semester certificate program will learn the state-of-the-art methods for treating Big Data and be exposed to the cutting-edge methods and theory forming the basis for the next generation of Big Data technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited college or university in computer science, math, statistics, engineering, natural sciences, or a related field.

Other requirements to be completed before admission:
The undergraduate degree must include statistics, calculus, multivariable calculus, linear algebra, and mathematical software environments such as Matlab or R or the equivalent, programming languages such as C++, Java, programming experience including algorithms and data structures normally taught in beginning computer science courses either as part of the undergraduate degree or subsequent work experience.

Special Application Requirements:
Admission application deadlines: rolling. Applicants are considered for fall or spring admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
- IELTS
  - Total Score: 6.5
- MELAB
  - Part 1 (Composition) score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F. A minimum GPA of 3.00 is required for students to remain in good standing.

Coursework Requirements (12 credits)
Select at least 3 credits from each of the 3 emphasis areas, plus 3 credits from any of the emphases or the electives list, in consultation with the advisor.

Algorithmics (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor. Students may complete PUBH 8475 or STAT 8056 but not both.

- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- EE 8591 - Predictive Learning from Data (3.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
  or STAT 8056 - Statistical Learning and Data Mining (3.0 cr)

Statistics (3 to 6 credits)
Select at least 3 credits from the following in consultation with the advisor:

- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5511 - Time Series Analysis (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
- STAT 8102 - Theory of Statistics 2 (3.0 cr)
- MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
  or STAT 5101 - Theory of Statistics I (4.0 cr)

Infrastructure and Large-Scale Computing (3 to 6 credits)
Select at least 6 credits from the following in consultation with the advisor:

- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
- EE 5351 - Applied Parallel Programming (3.0 cr)
- CSCI 8205 - Parallel Computer Organization (3.0 cr)
  or EE 8367 - Parallel Computer Organization (3.0 cr)

Electives (0 to 3 credits)
Select credits as needed, in consultation with the advisor, to complete the 12-credit minimum. Other courses may be selected with advisor and director of graduate studies approval.

- CSCI 5103 - Operating Systems (3.0 cr)
- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5123 - Recommender Systems (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5527 - Deep Learning: Models, Computation, and Applications (3.0 cr)
- CSCI 5541 - Natural Language Processing (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
Twin Cities Campus
Earth Sciences M.S.
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Earth and Environmental Sciences, University of Minnesota, John T. Tate Hall-Suite 150, 116 Church St. SE, Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: esci@umn.edu
Website: https://cse.umn.edu/esci

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, geobiochemistry, geobiology, paleontology and paleobiology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students complete one of the following tracks: Geology, Geophysics, Biogeology, Hydrogeology, or Earth Sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in geology, geophysics, earth and material sciences, chemistry, physics, biology, or environmental science.

Other requirements to be completed before admission:
At least one year each of study in calculus, chemistry, and physics is required. In general, an outstanding academic record is expected.

Special Application Requirements:
Materials for a complete application file include the student's statement of purpose, optional diversity statement, three letters of recommendation, transcripts, and the Application for Admission. Applications are considered at any time; however, to be considered for financial aid, all materials must be submitted by December 15. Studies may begin in any semester or summer session, although fall semester is preferable.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 to 22 major credits and 8 to 16 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B project comprises one or more projects such as a research paper, presentation of research results, and/or completion of a faculty-supervised research experience.

**Plan C:** Plan C requires 14 to 21 major credits and 9 to 16 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F. A maximum of 4.0 credits of ESCI 8994 are allowed to count toward the degree.

**Required Courses (3 credits)**

Take 1 credit of ESCI 8980. Both courses should be taken in the first year of study.

- ESCI 8001 - Introductory Graduate Seminar (2.0 cr)
- ESCI 8980 - Seminar: Current Topics in Earth & Environmental Sciences (1.0 - 4.0 cr)

**Outside Coursework (6 to 9 credits)**

Plan A students select 6 credits, Plan B students select 8 credits, and Plan C students select 9 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.

- ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 5551 - Environmental Microbiology (3.0 cr)
- CEGE 5552 - Environmental Microbiology Laboratory (1.0 cr)
- CHEM 4501 - Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- EE 5531 - Probability and Stochastic Processes (3.0 cr)
- EE 8581 - Detection and Estimation Theory (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5407 - Ecology (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- ESPM 5402 - Biometeorology (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
- LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
- LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
- LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
- MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
- MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
- MATS 5517 - Microscopy of Materials (3.0 cr)
- MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
Electives
Select courses from the following as needed, in consultation with the advisor, to complete the minimum number of course credits required:

- ESCI 4203 - Environmental Geophysics (3.0 cr)
- ESCI 4204 - Geomagnetism and Paleomagnetism (3.0 cr)
- ESCI 4212 - Geodynamics (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
- ESCI 4501 - Structural Geology (3.0 cr)
- ESCI 4502 - Tectonic Styles (3.0 cr)
- ESCI 4602 - Sedimentology and Stratigraphy (3.0 cr)
- ESCI 4701 - Geomorphology (4.0 cr)
- ESCI 4702 - General Hydrogeology (4.0 cr)
- ESCI 4703 - Glacial Geology (4.0 cr)
- ESCI 4801 - Geomicrobiology (3.0 cr)
- ESCI 4911 - Advanced Field Geology (4.0 cr)
- ESCI 5102 - Climate Change and Human History (3.0 cr)
- ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
- ESCI 5203 - Mineral and Rock Physics (3.0 cr)
- ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
- ESCI 5302 - Isotope Geology (3.0 cr)
- ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
- ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
- ESCI 5403 - Computer Applications in Earth & Environmental Sciences (3.0 cr)
- ESCI 5503 - Advanced Petrology (3.0 cr)
- ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
- ESCI 5805 - Standards and Practices for Professional Geoscientists (3.0 cr)
- ESCI 5971 - Field Hydrogeology (2.0 cr)
- ESCI 5980 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
- ESCI 8203 - Environmental Geophysics (3.0 cr)
- ESCI 8204 - Geomagnetism and Paleomagnetism (3.0 cr)
- ESCI 8243 - Principles of Rock Magnetism (1.0 - 3.0 cr)
- ESCI 8353 - Phase Equilibrium in Mineral Systems (3.0 cr)
- ESCI 8354 - Igneous Petrology (3.0 cr)
- ESCI 8355 - Metamorphic Petrology (3.0 cr)
- ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
- ESCI 8501 - Structural Geology (4.0 cr)
- ESCI 8502 - Tectonic Styles (3.0 cr)
- ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
- ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
- ESCI 8602 - Stream Restoration Practice (2.0 cr)
- ESCI 8701 - Geomorphology (4.0 cr)
- ESCI 8712 - Transport Phenomena and Analytical Geohydrology (3.0 - 4.0 cr)
- ESCI 8718 - Numerical Methods in Hydrogeology (4.0 cr)
- ESCI 8801 - Geomicrobiology (3.0 cr)
- ESCI 8970 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
- ESCI 8994 - Research in Earth Sciences (1.0 - 4.0 cr)

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
ESCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Biogeology
This sub-plan is limited to students completing the program under Plan A or Plan B.
Biogeology represents a rapidly growing area at the intersection between Earth and the life sciences. It includes research in microbial evolution and biochemistry, microbe/mineral chemical interactions, the role of organisms in basic geological processes, the principles through which organisms or organic compounds can be used to reconstruct surface conditions, biogeochemical cycling, pollution control and remediation, the origin of life on Earth, and astrobiology.

**Required Courses (6 credits)**
Take the following courses:
- **ESCI 8402** - Biogeochemical Cycles in the Ocean (3.0 cr)
- **ESCI 8801** - Geomicrobiology (3.0 cr)

**Earth Sciences**
This sub-plan is limited to students completing the program under Plan A or Plan B.

This generalist track exists for students whose curriculum and/or thesis, paper, or project do not fit any of the other tracks. A curriculum specific to the student will be set through the compact process.

**Required Courses (6 credits)**
Select 6 credits from the following in consultation with the advisor:
- **ESCI 4xxx**
- **ESCI 5xxx**
- **ESCI 8xxx**

**Geology**
This sub-plan is limited to students completing the program under Plan A or Plan B.

Geology uses field observation, laboratory work, analog and computer modeling, chemical and biological probes and assays to understand Earth's coupled rock, water and biological systems, the underlying processes, and their history of interaction as evidenced in the rock record.

**Required Courses (6 credits)**
Select 6 credits from the following in consultation with the advisor:
- **ESCI 5302** - Isotope Geology (3.0 cr)
- **ESCI 5353** - Electron Microprobe Theory and Practice (3.0 cr)
- **ESCI 5503** - Advanced Petrology (3.0 cr)
- **ESCI 5705** - Limnogeology and Paleoenvironment (3.0 cr)

**Geophysics**
This sub-plan is limited to students completing the program under Plan A or Plan B.

Geophysics uses remote sensing probes (seismic waves, potential fields, etc.), laboratory simulation of deep earth conditions and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history, and dynamics of solid Earth and other planets.

**Required Courses (6 credits)**
Select 6 credits from the following in consultation with the advisor:
- **ESCI 4212** - Geodynamics (3.0 cr)
- **ESCI 5201** - Time-Series Analysis of Geological Phenomena (3.0 cr)
- **ESCI 5203** - Mineral and Rock Physics (3.0 cr)
- **ESCI 5204** - Geostatistics and Inverse Theory (3.0 cr)
- **ESCI 8203** - Environmental Geophysics (3.0 cr)
- **ESCI 8204** - Geomagnetism and Paleomagnetism (3.0 cr)

**Hydrogeology**
The Hydrogeology track is the only option available to all students, including those pursuing the Plan C option.

Hydrogeology uses direct observation and remote sensing, computer modeling and laboratory simulation to constrain the interaction of water and rock in Earth's shallow subsurface. Freshwater is Earth's most precious and increasingly overexploited resource. Hydrogeology is a key discipline in the effective shepherding of this important reserve. This track establishes a baseline curriculum for hydrogeology at the graduate level. The compact process will identify additional coursework appropriate to the student's prior training and research directions.
Required Courses (6 credits)
Take the following courses:
ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 5971 - Field Hydrogeology (2.0 cr)
Twin Cities Campus
Earth Sciences Minor
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Earth and Environmental Sciences, University of Minnesota, John T. Tate Hall-Suite 150, 116 Church St. SE, Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: esci@umn.edu
Website: https://cse.umn.edu/esci

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, geobiology, geobiochemistry, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Earth Sciences director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for the minor is 3.00.

Minor Courses (6 to 12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Earth Sciences director of graduate studies. Other courses may be chosen with the approval of the Earth Sciences director of graduate studies.

ESCI 4203 - Environmental Geophysics (3.0 cr)
ESCI 4204 - Geomagnetism and Paleomagnetism (3.0 cr)
ESCI 4212 - Geodynamics (3.0 cr)
ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 4501 - Structural Geology (3.0 cr)
ESCI 4502 - Tectonic Styles (3.0 cr)
ESCI 4602 - Sedimentology and Stratigraphy (3.0 cr)
ESCI 4701 - Geomorphology (4.0 cr)
ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 4703 - Glacial Geology (4.0 cr)
ESCI 4801 - Geomicrobiology (3.0 cr)
ESCI 4911 - Advanced Field Geology (4.0 cr)
ESCI 5102 - Climate Change and Human History (3.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
ESCI 5203 - Mineral and Rock Physics (3.0 cr)
ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
ESCI 5302 - Isotope Geology (3.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
ESCI 5403 - Computer Applications in Earth & Environmental Sciences (3.0 cr)
ESCI 5503 - Advanced Petrology (3.0 cr)
ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
ESCI 5805 - Standards and Practices for Professional Geoscientists (3.0 cr)
ESCI 5971 - Field Hydrogeology (2.0 cr)
ESCI 5980 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
ESCI 8203 - Environmental Geophysics (3.0 cr)
ESCI 8204 - Geomagnetism and Paleomagnetism (3.0 cr)
ESCI 8243 - Principles of Rock Magnetism (1.0 - 3.0 cr)
ESCI 8353 - Phase Equilibrium in Mineral Systems (3.0 cr)
ESCI 8354 - Igneous Petrology (3.0 cr)
ESCI 8355 - Metamorphic Petrology (3.0 cr)
ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 8501 - Structural Geology (4.0 cr)
ESCI 8502 - Tectonic Styles (3.0 cr)
ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
ESCI 8602 - Stream Restoration Practice (2.0 cr)
ESCI 8701 - Geomorphology (4.0 cr)
ESCI 8712 - Transport Phenomena and Analytical Geohydrology (3.0 - 4.0 cr)
ESCI 8718 - Numerical Methods in Hydrogeology (4.0 cr)
ESCI 8801 - Geomicrobiology (3.0 cr)
ESCI 8970 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Earth Sciences Ph.D.
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Earth and Environmental Sciences, University of Minnesota, John T. Tate Hall-Suite 150, 116 Church St. SE, Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: esci@umn.edu
Website: https://cse.umn.edu/esci

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, geobiochemistry, geobiology, paleontology and paleobiology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students complete one of the following tracks: Geology, Geophysics, Biogeology, Hydrogeology, or Earth Sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree in geology, geophysics, earth and material sciences, chemistry, physics, biology, or environmental science.

Other requirements to be completed before admission:
At least one year of study each in calculus, chemistry, and physics is required. In general, an outstanding academic record is expected.

Special Application Requirements:
Materials for a complete application file include the student's statement of purpose, an optional diversity statement, three letters of recommendation, transcripts, and the Application for Admission. Applications are considered at any time; however, to be considered for financial aid, all materials must be submitted by December 15. Studies may begin in any semester or summer session, although fall semester is preferable.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Coursework offered on both the A-F and S/N grading basis must be taken A-F. A maximum of 4.0 units of ESCI 8994 is allowed to count toward the degree.

Required Courses (3 credits)
Take 1 credit of ESCI 8980. Both courses should be taken in the first year of study.
ESCI 8001 - Introductory Graduate Seminar (2.0 cr)
ESCI 8980 - Seminar: Current Topics in Earth & Environmental Sciences (1.0 - 4.0 cr)

Outside Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.
ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
CEGE 4501 - Hydraulic Design (4.0 cr)
CEGE 4512 - Open Channel Hydraulics (4.0 cr)
CEGE 5541 - Environmental Water Chemistry (3.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr) (4.0 cr)
CEGE 5552 - Environmental Microbiology Laboratory (1.0 cr)
CHEM 4501 - Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5581 - Detection and Estimation Theory (3.0 cr)
EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
EEB 5407 - Ecology (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
ESPM 5402 - Biometeorology (3.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
LAAS 5521 - Environmental Genomics and Microbiomes (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)

Elective Courses
Select courses from the following as needed, in consultation with the advisor, to complete the minimum number of course credits required.
ESCI 4203 - Environmental Geophysics (3.0 cr)
ESCI 4204 - Geomagnetism and Paleomagnetism (3.0 cr)
ESCI 4212 - Geodynamics (3.0 cr)
ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 4501 - Structural Geology (3.0 cr)
ESCI 4502 - Tectonic Styles (3.0 cr)
ESCI 4602 - Sedimentology and Stratigraphy (3.0 cr)
ESCI 4701 - Geomorphology (4.0 cr)
ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 4703 - Glacial Geology (4.0 cr)
ESCI 4801 - Geomicrobiology (3.0 cr)
ESCI 4911 - Advanced Field Geology (4.0 cr)
ESCI 5102 - Climate Change and Human History (3.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
ESCI 5203 - Mineral and Rock Physics (3.0 cr)
ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
ESCI 5302 - Isotope Geology (3.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
ESCI 5403 - Computer Applications in Earth & Environmental Sciences (3.0 cr)
ESCI 5503 - Advanced Petrology (3.0 cr)
ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
ESCI 5805 - Standards and Practices for Professional Geoscientists (3.0 cr)
ESCI 5971 - Field Hydrogeology (2.0 cr)
ESCI 5980 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
ESCI 8203 - Environmental Geophysics (3.0 cr)
ESCI 8204 - Geomagnetism and Paleomagnetism (3.0 cr)
ESCI 8243 - Principles of Rock Magnetism (1.0 - 3.0 cr)
ESCI 8353 - Phase Equilibrium in Mineral Systems (3.0 cr)
ESCI 8354 - Igneous Petrology (3.0 cr)
ESCI 8355 - Metamorphic Petrology (3.0 cr)
ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 8501 - Structural Geology (4.0 cr)
ESCI 8502 - Tectonic Styles (3.0 cr)
ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
ESCI 8602 - Stream Restoration Practice (2.0 cr)
ESCI 8701 - Geomorphology (4.0 cr)
ESCI 8712 - Transport Phenomena and Analytical Geohydrology (3.0 - 4.0 cr)
ESCI 8718 - Numerical Methods in Hydrogeology (4.0 cr)
ESCI 8801 - Geomicrobiology (3.0 cr)
ESCI 8970 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
ESCI 8994 - Research in Earth Sciences (1.0 - 4.0 cr)

Thesis Credits (24 credits)
Take 24 doctoral thesis credits after passing the preliminary oral exam.
ESCI 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Biogeology
Biogeology represents a rapidly growing area at the intersection between Earth and the life sciences. It includes research in microbial evolution and biochemistry, microbe/mineral chemical interactions, the role of organisms in basic geological processes, the principles through which organisms or organic compounds can be used to reconstruct surface conditions, biogeochemical cycling, pollution control and remediation, the origin of life on Earth, and astrobiology.

Required Courses (6 credits)
Take the following courses:
ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 8801 - Geomicrobiology (3.0 cr)

Earth Sciences
This generalist track exists for students whose curriculum and/or dissertation do not fit any of the other tracks. A curriculum specific to the student will be set through the compact process.
Required Courses (6 credits)
Select 6 credits from the following in consultation with the advisor:
ESCI 4xxx
ESCI 5xxx
ESCI 8xxx

Geology
Geology uses field observation, laboratory work, analog and computer modeling, chemical and biological probes and assays to understand Earth's coupled rock, water and biological systems, the underlying processes, and their history of interaction as evidenced in the rock record.

Required Courses (6 credits)
Select 6 credits from the following in consultation with the advisor:
ESCI 5302 - Isotope Geology (3.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
ESCI 5503 - Advanced Petrology (3.0 cr)
ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)

Geophysics
Geophysics uses remote sensing probes (seismic waves, potential fields, etc.), laboratory simulation of deep Earth conditions and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history and dynamics of solid Earth and other planets.

Required Courses (6 credits)
Select 6 credits from the following in consultation with the advisor:
ESCI 4212 - Geodynamics (3.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
ESCI 5203 - Mineral and Rock Physics (3.0 cr)
ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
ESCI 8203 - Environmental Geophysics (3.0 cr)
ESCI 8204 - Geomagnetism and Paleomagnetism (3.0 cr)

Hydrogeology
Hydrogeology uses direct observation and remote sensing, computer modeling and laboratory simulation to constrain the interaction of water and rock in Earth's shallow subsurface. Freshwater is Earth's most precious and increasingly overexploited resource. Hydrogeology is a key discipline in the effective shepherding of this important reserve. This track establishes a baseline curriculum for hydrogeology at the graduate level. The compact process will identify additional coursework appropriate to the student's prior training and research directions.

Required Courses (6 credits)
Take the following courses:
ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 5971 - Field Hydrogeology (2.0 cr)
Twin Cities Campus
Electrical and Computer Engineering MS.E.C.E.
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-3564; fax: 612-625-4583)
Email: newgrad@umn.edu
Website: https://cse.umn.edu/ece

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

Other requirements to be completed before admission:
Consideration is given to students who have completed another curriculum in engineering, science, physics, or mathematics that includes sufficient preparation to pursue a graduate program in electrical and computer engineering. In some instances, additional preparatory studies may be required after admission.

Special Application Requirements:
All documents must be submitted electronically. No documents should be mailed to the department or the Graduate Admissions Office.

Applications for admission are considered for fall admission only and the deadline for applying is December 1. Applications submitted after the fall deadline will be considered if space is available. Minnesota residents employed full-time who wish to pursue the degree part-time may apply for spring admission.

The GRE test is not required and will not be accepted as part of the application.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
- Total Score: 6.5
- MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 18 to 24 major credits and 6 to 12 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The Plan C project requirement can be satisfied by taking EE 8965 (3 credits) or through completion of specific major field courses. Adviser approval is required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Non-EE coursework that is cross-listed with Electrical Engineering must be taken with the EE course subject.

Application of 4xxx-level coursework to degree requirements is restricted to 9 credits from the courses listed below, of which no more than 6 can be from EE courses.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of C earned for each course.

Part-time students must choose the Plan C option; full-time students may choose either Plan A or Plan C.

**Plan Options**

**Plan A**

Requirements

**Major Coursework (14 credits)**

Select 14 credits from the following in consultation with the advisor.

A maximum of 2 credits of the following courses may be selected: EE 5041, EE 8190, EE 8210, EE 8230, EE 8360, EE 8370, EE 8500, EE 8610, EE 8660, EE 8920, EE 8925, EE 8940, and MOT 4001.

- EE 4111 - Advanced Analog Electronics Design (4.0 cr)
- EE 4161W - Energy Conversion and Storage [WI] (3.0 cr)
- EE 4163 - Energy Conversion and Storage Laboratory (1.0 cr)
- EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
- EE 4233 - State Space Control System Design (3.0 cr)
- EE 4235 - Linear Control Systems Laboratory (1.0 cr)
- EE 4237 - State Space Control Laboratory (1.0 cr)
- EE 4301 - Digital Design With Programmable Logic (4.0 cr)
- EE 4303 - Introduction to Programmable Devices Laboratory (1.0 cr)
- EE 4341 - Embedded System Design (4.0 cr)
- EE 4363 - Computer Architecture and Machine Organization (4.0 cr)
- EE 4389W - Introduction to Predictive Learning [WI] (3.0 cr)
- EE 4501 - Communications Systems (3.0 cr)
- EE 4505 - Communications Systems Laboratory (1.0 cr)
- EE 4541 - Digital Signal Processing (3.0 cr)
- EE 4607 - Wireless Hardware System Design (3.0 cr)
- EE 4616 - Antennas: Theory, Analysis, and Design (3.0 cr)
- EE 4701 - Electric Drives (3.0 cr)
- EE 4703 - Electric Drives Laboratory (1.0 cr)
- EE 4721 - Introduction to Power System Analysis (3.0 cr)
- EE 4722 - Power System Analysis Laboratory (1.0 cr)
- EE 4741 - Power Electronics (3.0 cr)
EE 4743 - Switch-Mode Power Electronics Laboratory (1.0 cr)
EE 5041 - Industrial Assignment for Graduate Students (1.0 cr)
EE 5121 - Transistor Device Modeling for Circuit Simulation (3.0 cr)
EE 5141 - Introduction to Microsystem Technology (4.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Micro and Nanotechnology by Self Assembly (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5271 - Robot Vision (3.0 cr)
EE 5301 - VLSI Design Automation I (3.0 cr)
EE 5302 - VLSI Design Automation II (3.0 cr)
EE 5323 - VLSI Design I (3.0 cr)
EE 5324 - VLSI Design II (3.0 cr)
EE 5327 - VLSI Design Laboratory (3.0 cr)
EE 5329 - VLSI Digital Signal Processing Systems (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5364 - Advanced Computer Architecture (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)
EE 5505 - Wireless Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5545 - Digital Signal Processing Design (3.0 cr)
EE 5549 - Digital Signal Processing Structures for VLSI (3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
EE 8556 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 8558 - Information Theory and Coding (3.0 cr)
EE 8559 - Error Control Coding (3.0 cr)
EE 8556 - Data Compression (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5602 - RF/Microwave Circuit Design (3.0 cr)
EE 5611 - Plasma-Aided Manufacturing (4.0 cr)
EE 5613 - RF/Microwave Circuit Design Laboratory (2.0 cr)
EE 5616 - Antenna Theory and Design (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5627 - Optical Fiber Communication (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology (4.0 cr)
EE 5705 - Electric Drives in Sustainable Energy Systems (3.0 cr)
EE 5707 - Electric Drives in Sustainable Energy Systems Laboratory (1.0 cr)
EE 5721 - Power Generation Operation and Control (3.0 cr)
EE 5741 - Advanced Power Electronics (3.0 cr)
EE 5745 - Wind Energy Essentials (2.0 cr)
EE 5940 - Special Topics in Electrical Engineering I (1.0 - 4.0 cr)
EE 5960 - Special Topics in Electrical Engineering III (1.0 - 4.0 cr)
EE 8100 - Advanced Topics in Electronics (1.0 - 3.0 cr)
EE 8141 - Advanced Heterojunction Transistors (3.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
EE 8163 - Quantum Electronics (3.0 cr)
EE 8190 - Electronics Seminar (1.0 cr)
EE 8210 - System Theory Seminar (1.0 cr)
EE 8213 - Advanced System Theory (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8230 - Control Theory Seminar (1.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8235 - Advanced Control Topics (3.0 cr)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>EE 8300</td>
<td>Advanced Topics in Computers</td>
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<tr>
<td>EE 8310</td>
<td>Advanced Topics in VLSI</td>
<td>1.0 - 3.0 cr</td>
</tr>
<tr>
<td>EE 8320</td>
<td>Advanced Topics in Design Automation</td>
<td>1.0 - 3.0 cr</td>
</tr>
<tr>
<td>EE 8331</td>
<td>CMOS Data Converters: A/D and D/A</td>
<td>3.0 cr</td>
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<tr>
<td>EE 8337</td>
<td>Analog Circuits for Wire/Wireless Communications</td>
<td>3.0 cr</td>
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<tr>
<td>EE 8360</td>
<td>Computer Systems Seminar</td>
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<tr>
<td>EE 8367</td>
<td>Parallel Computer Organization</td>
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<tr>
<td>EE 8370</td>
<td>Computer Aided Design Seminar</td>
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<tr>
<td>EE 8500</td>
<td>Seminar: Communications</td>
<td>1.0 cr</td>
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<tr>
<td>EE 8510</td>
<td>Advanced Topics in Communications</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>EE 8520</td>
<td>Advanced Topics in Signal Processing</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>EE 8581</td>
<td>Detection and Estimation Theory</td>
<td>3.0 cr</td>
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<tr>
<td>EE 8591</td>
<td>Predictive Learning from Data</td>
<td>3.0 cr</td>
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<tr>
<td>EE 8601</td>
<td>Advanced Electromagnetic Theory</td>
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<tr>
<td>EE 8610</td>
<td>Seminar: Electronics, Fields, and Photonics</td>
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<td>EE 8611</td>
<td>Plasma Physics</td>
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<td>EE 8620</td>
<td>Advanced Topics in Magnetics</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>EE 8630</td>
<td>Advanced Topics in Electromagnetics</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>EE 8660</td>
<td>Seminar: Magnetics</td>
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<tr>
<td>EE 8725</td>
<td>Advanced Power System Analysis and Economics</td>
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<td>EE 8741</td>
<td>Power Electronics in Power Systems</td>
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<td>EE 8920</td>
<td>Teaching Experience in Electrical and Computer Engineering</td>
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<td>EE 8925</td>
<td>Ethics in Electrical and Computer Engineering</td>
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<tr>
<td>EE 8940</td>
<td>Special Investigations</td>
<td>1.0 - 3.0 cr</td>
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<td>EE 8950</td>
<td>Advanced Topics in Electrical and Computer Engineering</td>
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<tr>
<td>MOT 4001</td>
<td>Leadership, Professionalism and Business Basics for Engineers</td>
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<tr>
<td>EE 8360</td>
<td>Seminar: Communications</td>
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</tbody>
</table>

**Outside Coursework (6 credits)**

Select 6 credits from the following to complete the 20 course credits required. Other courses can be selected with advisor and director of graduate studies approval.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AEM 4203</td>
<td>Aerospace Propulsion</td>
<td>4.0 cr</td>
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<tr>
<td>AEM 4290</td>
<td>Special Topics in Fluid Mechanics</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>AEM 4301</td>
<td>Orbital Mechanics</td>
<td>3.0 cr</td>
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<tr>
<td>AEM 4303W</td>
<td>Flight Dynamics and Control [WI]</td>
<td>3.0 cr</td>
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<td>AEM 4305</td>
<td>Spacecraft Attitude Dynamics and Control</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>AEM 4331</td>
<td>Aerospace Vehicle Design</td>
<td>4.0 cr</td>
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<tr>
<td>AEM 4333</td>
<td>Aerospace Design: Special Projects</td>
<td>3.0 cr</td>
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<tr>
<td>AEM 4490</td>
<td>Special Topics in Aerospace Systems</td>
<td>1.0 - 3.0 cr</td>
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<td>AEM 4501</td>
<td>Aerospace Structures</td>
<td>3.0 cr</td>
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<td>AEM 4502</td>
<td>Computational Structural Analysis</td>
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<td>AEM 4511</td>
<td>Mechanics of Composite Materials</td>
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<tr>
<td>AEM 4581</td>
<td>Mechanics of Solids</td>
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<tr>
<td>AEM 4590</td>
<td>Special Topics in Solid Mechanics and Materials</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>AEM 4601</td>
<td>Instrumentation Laboratory</td>
<td>3.0 cr</td>
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<tr>
<td>AEM 4602W</td>
<td>Aeromechanics Laboratory [WI] (4.0 cr)</td>
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<td>AEM 5247</td>
<td>Hypersonic Aerodynamics</td>
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<td>AEM 5253</td>
<td>Computational Fluid Mechanics</td>
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<td>AEM 5333</td>
<td>Design-to-Flight: Small Uninhabited Aerial Vehicles</td>
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<td>AEM 5401</td>
<td>Intermediate Dynamics</td>
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<td>AEM 5501</td>
<td>Continuum Mechanics</td>
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<td>AEM 5503</td>
<td>Theory of Elasticity</td>
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<td>AEM 5581</td>
<td>Mechanics of Solids</td>
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<td>AEM 5651</td>
<td>Aeroelasticity</td>
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<td>BBE 5023</td>
<td>Process Control and Instrumentation</td>
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<td>BBE 5333</td>
<td>Off-road Vehicle Design</td>
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<td>BBE 5733</td>
<td>Renewable Energy Technologies</td>
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<td>BIOC 5361</td>
<td>Microbial Genomics and Bioinformatics</td>
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<td>BIOC 5528</td>
<td>Spectroscopy and Kinetics</td>
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<td>BIOL 4003</td>
<td>Genetics</td>
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<td>BIOL 4004</td>
<td>Cell Biology</td>
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<td>BIOL 5272</td>
<td>Applied Biostatistics</td>
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<td>BMEN 5001</td>
<td>Advanced Biomaterials</td>
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<td>BMEN 5041</td>
<td>Tissue Engineering</td>
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<td>BMEN 5101</td>
<td>Advanced Bioelectricity and Instrumentation</td>
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<td>BMEN 5111</td>
<td>Biomedical Ultrasound</td>
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<tr>
<td>BMEN 5151</td>
<td>Introduction to BioMEMS and Medical Microdevices</td>
<td>2.0 cr</td>
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<tr>
<td>BMEN 5201</td>
<td>Advanced Biomechanics</td>
<td>3.0 cr</td>
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Information current as of November 07, 2022
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<th>Course Code</th>
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MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5583 - Complex Analysis (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 5654 - Prediction and Filtering (4.0 cr)
MATH 5705 - Enumerative Combinatorics (4.0 cr)
MATH 5707 - Graph Theory and Non-enumerative Combinatorics (4.0 cr)
MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 5531 - Electrochemical Engineering (3.0 cr)
MATS 5771 - Colloids and Dispersions (3.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5223 - Materials in Design (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5281 - Feedback Control Systems (4.0 cr)
ME 5286 - Robotics (4.0 cr)
ME 5312 - Solar Thermal Technologies (4.0 cr)
ME 5344 - Thermodynamics of Fluid Flow With Applications (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 5461 - Internal Combustion Engines (4.0 cr)
MPHY 5170 - Radiation Therapy Physics I (3.0 cr)
MPHY 5171 - Medical and Health Physics of Imaging I (3.0 cr)
MPHY 5174 - Medical and Health Physics of Imaging II (3.0 cr)
NSC 5040 - Brain Networks: From Connectivity to Dynamics (4.0 cr)
NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
NSC 5203 - Basic and Clinical Vision Science (3.0 cr)
NSC 5561 - Systems Neuroscience (4.0 cr)
PHYS 4001 - Analytical Mechanics (4.0 cr)
PHYS 4002 - Electricity and Magnetism (4.0 cr)
PHYS 4004 - Computational Methods in the Physical Sciences (4.0 cr)
PHYS 4051 - Methods of Experimental Physics I (5.0 cr)
PHYS 4052W - Methods of Experimental Physics II [WI] (5.0 cr)
PHYS 4101 - Quantum Mechanics (4.0 cr)
PHYS 4121W - History of 20th-Century Physics [WI] (3.0 cr)
PHYS 4201 - Statistical and Thermal Physics (3.0 cr)
PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
PHYS 4303 - Electrodynamics and Waves (3.0 cr)
PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
PHYS 4611 - Introduction to Space Physics (3.0 cr)
PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
PHYS 4911 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5011 - Classical Physics I (4.0 cr)
PHYS 5012 - Classical Physics II (4.0 cr)
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 5051 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PMB 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
SSM 5612 - Systems Approach to Building Science and Construction (4.0 cr)
SSM 5614 - Building Systems Performance: Testing & Diagnostics (2.0 cr)
STAT 4101 - Theory of Statistics I (4.0 cr)
STAT 4102 - Theory of Statistics II (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)

Thesis Credits
Take 10 master's thesis credits.
EE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan C
Requirements

Major Coursework (18 credits)
Select 18 credits from the following in consultation with the advisor. Consult with the advisor regarding coursework most appropriate for satisfying the Plan C project requirement. Other courses can be chosen with advisor and director of graduate studies approval.
EE 5121 - Transistor Device Modeling for Circuit Simulation (3.0 cr)
EE 5141 - Introduction to Microsystem Technology (4.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Micro and Nanotechnology by Self Assembly (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5271 - Robot Vision (3.0 cr)
EE 5301 - VLSI Design Automation I (3.0 cr)
EE 5302 - VLSI Design Automation II (3.0 cr)
EE 5323 - VLSI Design I (3.0 cr)
EE 5324 - VLSI Design II (3.0 cr)
EE 5327 - VLSI Design Laboratory (3.0 cr)
EE 5329 - VLSI Digital Signal Processing Systems (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5364 - Advanced Computer Architecture (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)
EE 5505 - Wireless Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5545 - Digital Signal Processing Design (3.0 cr)
EE 5549 - Digital Signal Processing Structures for VLSI (3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5583 - Error Control Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5602 - RF/Microwave Circuit Design (3.0 cr)
EE 5611 - Plasma-Aided Manufacturing (4.0 cr)
EE 5613 - RF/Microwave Circuit Design Laboratory (2.0 cr)
EE 5616 - Antenna Theory and Design (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5627 - Optical Fiber Communication (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology (4.0 cr)
EE 5705 - Electric Drives in Sustainable Energy Systems (3.0 cr)
EE 5707 - Electric Drives in Sustainable Energy Systems Laboratory (1.0 cr)
EE 5721 - Power Generation Operation and Control (3.0 cr)
EE 5741 - Advanced Power Electronics (3.0 cr)
EE 5745 - Wind Energy Essentials (2.0 cr)
EE 5811 - Biological Instrumentation (3.0 cr)
EE 5940 - Special Topics in Electrical Engineering I (1.0 - 4.0 cr)
EE 5960 - Special Topics in Electrical Engineering III (1.0 - 4.0 cr)
EE 8100 - Advanced Topics in Electronics (1.0 - 3.0 cr)
EE 8141 - Advanced Heterojunction Transistors (3.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
EE 8163 - Quantum Electronics (3.0 cr)
EE 8213 - Advanced System Theory (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8235 - Advanced Control Topics (3.0 cr)
EE 8300 - Advanced Topics in Computers (1.0 - 3.0 cr)
EE 8310 - Advanced Topics in VLSI (1.0 - 3.0 cr)
EE 8320 - Advanced Topics in Design Automation (1.0 - 3.0 cr)
EE 8331 - CMOS Data Converters: A/D and D/A (3.0 cr)
EE 8337 - Analog Circuits for Wire/Wireless Communications (3.0 cr)
EE 8367 - Parallel Computer Organization (3.0 cr)
EE 8510 - Advanced Topics in Communications (1.0 - 3.0 cr)
EE 8520 - Advanced Topics in Signal Processing (1.0 - 3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8601 - Advanced Electromagnetic Theory (3.0 cr)
EE 8611 - Plasma Physics (3.0 cr)
EE 8620 - Advanced Topics in Magnetics (1.0 - 3.0 cr)
EE 8630 - Advanced Topics in Electromagnetics (1.0 - 3.0 cr)
EE 8725 - Advanced Power System Analysis and Economics (3.0 cr)
EE 8741 - Power Electronics in Power Systems (3.0 cr)
EE 8744 - Modeling, Analysis, and Control of Renewable Energy Systems (3.0 cr)
EE 8950 - Advanced Topics in Electrical and Computer Engineering (3.0 cr)
EE 8965 - Plan C Project I (3.0 cr)

Outside Coursework (6 credits)
Select at least 6 credits from the following. Other courses can be selected with advisor and director of graduate studies approval.

AEM 4203 - Aerospace Propulsion (4.0 cr)
AEM 4290 - Special Topics in Fluid Mechanics (1.0 - 3.0 cr)
AEM 4301 - Orbital Mechanics (3.0 cr)
AEM 4303W - Flight Dynamics and Control [WI] (3.0 cr)
AEM 4305 - Spacecraft Attitude Dynamics and Control (3.0 cr)
AEM 4331 - Aerospace Vehicle Design (4.0 cr)
AEM 4333 - Aerospace Design: Special Projects (3.0 cr)
AEM 4490 - Special Topics in Aerospace Systems (1.0 - 3.0 cr)
AEM 4501 - Aerospace Structures (3.0 cr)
AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 4581 - Mechanics of Solids (3.0 cr)
AEM 4590 - Special Topics in Solid Mechanics and Materials (1.0 - 3.0 cr)
AEM 4601 - Instrumentation Laboratory (3.0 cr)
AEM 4602W - Aeromechanics Laboratory [WI] (4.0 cr)
AEM 5247 - Hypersonic Aerodynamics (3.0 cr)
AEM 5253 - Computational Fluid Mechanics (3.0 cr)
AEM 5333 - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 5651 - Aeroelasticity (3.0 cr)
BBE 5023 - Process Control and Instrumentation (3.0 cr)
BBE 5333 - Off-road Vehicle Design (4.0 cr)
BBE 5733 - Renewable Energy Technologies (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOL 4003 - Genetics (3.0 cr)
BIOL 4004 - Cell Biology (3.0 cr)
BIOL 5272 - Applied Biostatistics (4.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
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<tr>
<td>PSY 5038W</td>
<td>Introduction to Neural Networks [WI]</td>
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</tbody>
</table>
SSM 5612 - Systems Approach to Building Science and Construction (4.0 cr)
SSM 5614 - Building Systems Performance: Testing & Diagnostics (2.0 cr)
STAT 4101 - Theory of Statistics I (4.0 cr)
STAT 4102 - Theory of Statistics II (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)

**Additional Coursework**

Select remaining courses in consultation with the advisor to complete the 30 course credits required for the major. Coursework can be EE or non-EE coursework and can be selected from the following list or the above Major Coursework or Outside Coursework lists.

A maximum of 2 credits of the following courses may be selected: EE 5041, EE 8190, EE 8210, EE 8230, EE 8360, EE 8370, EE 8500, EE 8610, EE 8660, EE 8920, EE 8925, EE 8940, and MOT 4001.

**EE Courses**

- EE 4111 - Advanced Analog Electronics Design (4.0 cr)
- EE 4161W - Energy Conversion and Storage [WI] (3.0 cr)
- EE 4163 - Energy Conversion and Storage Laboratory (1.0 cr)
- EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
- EE 4233 - State Space Control System Design (3.0 cr)
- EE 4235 - Linear Control Systems Laboratory (1.0 cr)
- EE 4237 - State Space Control Laboratory (1.0 cr)
- EE 4301 - Digital Design With Programmable Logic (4.0 cr)
- EE 4303 - Introduction to Programmable Devices Laboratory (1.0 cr)
- EE 4341 - Embedded System Design (4.0 cr)
- EE 4363 - Computer Architecture and Machine Organization (4.0 cr)
- EE 4389W - Introduction to Predictive Learning [WI] (3.0 cr)
- EE 4501 - Communications Systems (3.0 cr)
- EE 4505 - Communications Systems Laboratory (1.0 cr)
- EE 4541 - Digital Signal Processing (3.0 cr)
- EE 4607 - Wireless Hardware System Design (3.0 cr)
- EE 4616 - Antennas: Theory, Analysis, and Design (3.0 cr)
- EE 4701 - Electric Drives (3.0 cr)
- EE 4703 - Electric Drives Laboratory (1.0 cr)
- EE 4721 - Introduction to Power System Analysis (3.0 cr)
- EE 4722 - Power System Analysis Laboratory (1.0 cr)
- EE 4741 - Power Electronics (3.0 cr)
- EE 4743 - Switch-Mode Power Electronics Laboratory (1.0 cr)
- EE 5041 - Industrial Assignment for Graduate Students (1.0 cr)
- EE 8190 - Electronics Seminar (1.0 cr)
- EE 8210 - System Theory Seminar (1.0 cr)
- EE 8230 - Control Theory Seminar (1.0 cr)
- EE 8360 - Computer Systems Seminar (1.0 cr)
- EE 8370 - Computer Aided Design Seminar (1.0 cr)
- EE 8500 - Seminar: Communications (1.0 cr)
- EE 8610 - Seminar: Electronics, Fields, and Photonics (1.0 cr)
- EE 8660 - Seminar: Magnetics (1.0 cr)
- EE 8920 - Teaching Experience in Electrical and Computer Engineering (1.0 cr)
- EE 8925 - Ethics in Electrical and Computer Engineering (1.0 cr)
- EE 8940 - Special Investigations (1.0 - 3.0 cr)
- MOT 4001 - Leadership, Professionalism and Business Basics for Engineers (2.0 cr)

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Rochester**

Students can complete all degree requirements in Rochester by combining courses taught by College of Science and Engineering faculty in person (face-to-face), or via streaming video using the UNITE (University-Industry Television for Education) instructional television system. UNITE enables students to watch class live via the internet or a special server at a later time.
Integrated B.E.E./MS.E.C.E.
The Department of Electrical and Computer Engineering offers an integrated bachelor of electrical engineering (BEE) and master of science in electrical and computer engineering (MSECE). The integrated BEE/MSECE program offers students the opportunity to earn both degrees in five years. The programs were established to allow high-achieving University undergraduates the opportunity to work toward a masters degree while simultaneously working toward their undergraduate degree. The combined program offers several advantages: flexibility in fulfilling required courses for both degrees during the senior year; eligibility for graduate assistantships and fellowships; and the ability to save money by completing up to 16 graduate credits at the undergraduate tuition rate.

BEE undergraduates can apply to the integrated BEE/MSECE degree program after they have completed a majority of their upper division required (non-elective) courses for their BEE degree.

Both the BEE and MSECE degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied.

Integrated B.Comp.E./MS.E.C.E.
The Department of Electrical and Computer Engineering offers an integrated bachelor of computer engineering (BCompE) and master of science in electrical and computer engineering (MSECE). Benefits, eligibility requirements, and degree-completion requirements outlined for the BEE/MSECE integrated program also apply to the BCompE/MSECE.
Twin Cities Campus

Electrical Engineering Minor
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-3564; fax: 612-625-4583)
Email: newgrad@umn.edu
Website: https://cse.umn.edu/ece

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory, to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Electrical Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of C earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Minor Coursework (6-12 credits)
Master's students select a minimum of 6 credits, and doctoral students select a minimum of 12 credits from the following in consultation with the Electrical Engineering director of graduate studies:
EE 5121 - Transistor Device Modeling for Circuit Simulation (3.0 cr)
EE 5141 - Introduction to Microsystem Technology (4.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Micro and Nanotechnology by Self Assembly (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5301 - VLSI Design Automation I (3.0 cr)
EE 5302 - VLSI Design Automation II (3.0 cr)
EE 5323 - VLSI Design I (3.0 cr)
EE 5324 - VLSI Design II (3.0 cr)
EE 5327 - VLSI Design Laboratory (3.0 cr)
EE 5329 - VLSI Digital Signal Processing Systems (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5364 - Advanced Computer Architecture (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)
EE 5505 - Wireless Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5545 - Digital Signal Processing Design (3.0 cr)
EE 5549 - Digital Signal Processing Structures for VLSI (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5583 - Error Control Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5602 - RF/Microwave Circuit Design (3.0 cr)
EE 5611 - Plasma-Aided Manufacturing (4.0 cr)
EE 5613 - RF/Microwave Circuit Design Laboratory (2.0 cr)
EE 5616 - Antenna Theory and Design (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5627 - Optical Fiber Communication (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology (4.0 cr)
EE 5705 - Electric Drives in Sustainable Energy Systems (3.0 cr)
EE 5707 - Electric Drives in Sustainable Energy Systems Laboratory (1.0 cr)
EE 5721 - Power Generation Operation and Control (3.0 cr)
EE 5741 - Advanced Power Electronics (3.0 cr)
EE 5745 - Wind Energy Essentials (2.0 cr)
EE 8141 - Advanced Heterojunction Transistors (3.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
EE 8163 - Quantum Electronics (3.0 cr)
EE 8213 - Advanced System Theory (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8331 - CMOS Data Converters: A/D and D/A (3.0 cr)
EE 8337 - Analog Circuits for Wire/Wireless Communications (3.0 cr)
EE 8367 - Parallel Computer Organization (3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
EE 8601 - Advanced Electromagnetic Theory (3.0 cr)
EE 8611 - Plasma Physics (3.0 cr)
EE 8725 - Advanced Power System Analysis and Economics (3.0 cr)
EE 8741 - Power Electronics in Power Systems (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.
Masters

Doctoral
Twin Cities Campus
Electrical Engineering Ph.D.
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-3564; fax: 612-625-4583)
Email: newgrad@umn.edu
Website: https://cse.umn.edu/ece

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

Other requirements to be completed before admission:
All documents must be submitted electronically. No documents should be mailed to the department or the Graduate Admissions Office.

Applicants to the doctoral program must submit a writing sample with their online application. The writing sample should consist of a minimum of one, to a maximum of three, class papers or publications.

Special Application Requirements:
Students are considered for admission beginning fall semester only (except for part-time students living in Minnesota who work in industry who may apply for other terms). The deadline for applying for fall semester is December 1.

The GRE test is not required and will not be accepted as part of the application.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

Non-EE coursework that is cross-listed with Electrical Engineering must be taken with the EE course subject.

A minimum of 6 course credits at the 8xxx-level is required. The 8xxx-level courses, with the exception of seminars, directed study, and special investigations, can be from the major or outside field.

Application of 4xxx-level coursework to degree requirements is restricted to 9 credits from the courses listed below, of which no more than 6 can be from EE courses.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of C earned for each course.

Breadth requirement: To satisfy the breadth requirement as part of the Preliminary Written Exam, students must take at least one course in a breadth area and receive a grade of B+ or above. This requirement is satisfied in consultation with the advisor.

Coursework
Major Coursework (14 credits)
Select 14 credits from the following in consultation with the advisor:
EE 5121 - Transistor Device Modeling for Circuit Simulation (3.0 cr)
EE 5141 - Introduction to Microsystem Technology (4.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Micro and Nanotechnology by Self Assembly (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5271 - Robot Vision (3.0 cr)
EE 5301 - VLSI Design Automation I (3.0 cr)
EE 5302 - VLSI Design Automation II (3.0 cr)
EE 5323 - VLSI Design I (3.0 cr)
EE 5324 - VLSI Design II (3.0 cr)
EE 5327 - VLSI Design Laboratory (3.0 cr)
EE 5329 - VLSI Digital Signal Processing Systems (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5351 - Applied Parallel Programming (3.0 cr)
EE 5364 - Advanced Computer Architecture (3.0 cr)
EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5501 - Digital Communication (3.0 cr)
EE 5505 - Wireless Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5545 - Digital Signal Processing Design (3.0 cr)
EE 5549 - Digital Signal Processing Structures for VLSI (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5581 - Information Theory and Coding (3.0 cr)
EE 5583 - Error Control Coding (3.0 cr)
EE 5585 - Data Compression (3.0 cr)
EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
EE 5602 - RF/Microwave Circuit Design (3.0 cr)
EE 5611 - Plasma-Aided Manufacturing (4.0 cr)
EE 5613 - RF/Microwave Circuit Design Laboratory (2.0 cr)
EE 5616 - Antenna Theory and Design (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5627 - Optical Fiber Communication (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology (4.0 cr)
EE 5670 - Electric Drives in Sustainable Energy Systems (3.0 cr)
EE 5707 - Electric Drives in Sustainable Energy Systems Laboratory (1.0 cr)
EE 5721 - Power Generation Operation and Control (3.0 cr)
EE 5741 - Advanced Power Electronics (3.0 cr)
EE 5745 - Wind Energy Essentials (2.0 cr)
EE 5940 - Special Topics in Electrical Engineering I (1.0 - 4.0 cr)
EE 5960 - Special Topics in Electrical Engineering III (1.0 - 4.0 cr)
EE 8100 - Advanced Topics in Electronics (1.0 - 3.0 cr)
EE 8141 - Advanced Heterojunction Transistors (3.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
EE 8163 - Quantum Electronics (3.0 cr)
EE 8213 - Advanced System Theory (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8235 - Advanced Control Topics (3.0 cr)
EE 8300 - Advanced Topics in Computers (1.0 - 3.0 cr)
EE 8310 - Advanced Topics in VLSI (1.0 - 3.0 cr)
EE 8320 - Advanced Topics in Design Automation (1.0 - 3.0 cr)
EE 8331 - CMOS Data Converters: A/D and D/A (3.0 cr)
EE 8337 - Analog Circuits for Wire/Wireless Communications (3.0 cr)
EE 8367 - Parallel Computer Organization (3.0 cr)
EE 8510 - Advanced Topics in Communications (1.0 - 3.0 cr)
EE 8520 - Advanced Topics in Signal Processing (1.0 - 3.0 cr)
EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
EE 8601 - Advanced Electromagnetic Theory (3.0 cr)
EE 8611 - Plasma Physics (3.0 cr)
EE 8620 - Advanced Topics in Magnetics (1.0 - 3.0 cr)
EE 8630 - Advanced Topics in Electromagnetics (1.0 - 3.0 cr)
EE 8725 - Advanced Power System Analysis and Economics (3.0 cr)
EE 8741 - Power Electronics in Power Systems (3.0 cr)
EE 8950 - Advanced Topics in Electrical and Computer Engineering (3.0 cr)

Outside Coursework (12 credits)
Select at least 12 credits from the following in consultation with the advisor. Other courses can be selected with advisor and director of graduate studies approval.

AEM 4203 - Aerospace Propulsion (4.0 cr)
AEM 4290 - Special Topics in Fluid Mechanics (1.0 - 3.0 cr)
AEM 4301 - Orbital Mechanics (3.0 cr)
AEM 4303W - Flight Dynamics and Control [WI] (3.0 cr)
AEM 4305 - Spacecraft Attitude Dynamics and Control (3.0 cr)
AEM 4331 - Aerospace Vehicle Design (4.0 cr)
AEM 4333 - Aerospace Design: Special Projects (3.0 cr)
AEM 4490 - Special Topics in Aerospace Systems (1.0 - 3.0 cr)
AEM 4501 - Aerospace Structures (3.0 cr)
AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 4581 - Mechanics of Solids (3.0 cr)
AEM 4590 - Special Topics in Solid Mechanics and Materials (1.0 - 3.0 cr)
AEM 4601 - Instrumentation Laboratory (3.0 cr)
AEM 4602W - Aeromechanics Laboratory [WI] (4.0 cr)

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Information current as of November 07, 2022
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<td>AEM 5253</td>
<td>Computational Fluid Mechanics</td>
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<td>AEM 5333</td>
<td>Design-to-Flight: Small Uninhabited Aerial Vehicles</td>
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<td>AEM 5401</td>
<td>Intermediate Dynamics</td>
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<td>AEM 5503</td>
<td>Theory of Elasticity</td>
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<td>Mechanics of Solids</td>
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<td>AEM 8202</td>
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<td>Convex Optimization Methods in Control</td>
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<td>AEM 8495</td>
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<td>BBE 5023</td>
<td>Process Control and Instrumentation</td>
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<td>BBE 5333</td>
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<td>Renewable Energy Technologies</td>
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<td>BIOC 5361</td>
<td>Microbial Genomics and Bioinformatics</td>
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<td>BMEN 5101</td>
<td>Advanced Bioelectricity and Instrumentation</td>
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<td>Biomedical Ultrasound</td>
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<td>BMEN 5151</td>
<td>Introduction to BioMEMS and Medical Microdevices</td>
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<td>BMEN 5351</td>
<td>Cell Engineering</td>
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<td>BMEN 5401</td>
<td>Advanced Biomedical Imaging</td>
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<td>BMEN 5411</td>
<td>Neural Engineering</td>
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<td>Neuromodulation</td>
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<td>Neural Decoding and Interfacing</td>
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<td>BMEN 5421</td>
<td>Introduction to Biomedical Optics</td>
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<td>BMEN 5501</td>
<td>Biology for Biomedical Engineers</td>
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<td>BMEN 5701</td>
<td>Cancer Bioengineering</td>
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<td>BMEN 8001</td>
<td>Polymeric Biomaterials</td>
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<td>BMEN 8041</td>
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<td>BMEN 8101</td>
<td>Biomedical Digital Signal Processing</td>
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CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
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CHEN 4214 - Polymers (3.0 cr)
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CHEN 4704 - Advanced Undergraduate Physical Rate Processes I: Transport (3.0 cr)
CHEN 4708 - Advanced Undergraduate Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
CHEN 5751 - Biochemical Engineering (3.0 cr)
CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
CHEN 5771 - Colloids and Dispersions (3.0 cr)
CHEN 8101 - Fluid Mechanics (3.0 cr)
CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
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CSCI 4061 - Introduction to Operating Systems (4.0 cr)
CSCI 4131 - Internet Programming (3.0 cr)
CSCI 4211 - Introduction to Computer Networks (3.0 cr)
CSCI 4511W - Introduction to Artificial Intelligence [WI] (4.0 cr)
CSCI 4611 - Programming Interactive Computer Graphics and Games (3.0 cr)
CSCI 4707 - Practice of Database Systems (3.0 cr)
CSCI 4921 - History of Computing [TS, HIS] (3.0 cr)
CSCI 4970W - Advanced Project Laboratory [WI] (3.0 cr)
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CSCI 5106 - Programming Languages (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5125 - Collaborative and Social Computing (3.0 cr)
CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
CSCI 5161 - Introduction to Compilers (3.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5471 - Modern Cryptography (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
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CSCI 5512 - Artificial Intelligence II (3.0 cr)
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<tr>
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<td>Methods of Experimental Physics II [WI]</td>
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<td>History of 20th-Century Physics [WI]</td>
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<td>Electrodynamics and Waves</td>
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<td>Introduction to Nuclear and Particle Physics</td>
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<td>Introduction to Plasma Physics</td>
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<td>Introduction to Biopolymer Physics</td>
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PHYS 5012 - Classical Physics II (4.0 cr)
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
PMB 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
SSM 5612 - Systems Approach to Building Science and Construction (4.0 cr)
SSM 5614 - Building Systems Performance: Testing & Diagnostics (2.0 cr)
STAT 4101 - Theory of Statistics I (4.0 cr)
STAT 4102 - Theory of Statistics II (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
STAT 8101 - Theory of Statistics I (3.0 cr)
STAT 8111 - Mathematical Statistics I (3.0 cr)
STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)
STAT 8931 - Advanced Topics in Statistics (3.0 cr)
STAT 8932 - Advanced Topics in Statistics (3.0 cr)

Additional Coursework
Select remaining courses in consultation with the advisor to complete the 40 course credits required for the major. Coursework can be EE or non-EE coursework and can be selected from the following list or the above Major Coursework or Outside Coursework lists.
A maximum of 2 credits of the following courses may be selected: EE 5041, EE 8190, EE 8210, EE 8230, EE 8360, EE 8370, EE 8500, EE 8610, EE 8660, EE 8920, EE 8925, EE 8940, and MOT 4001.
EE 4111 - Advanced Analog Electronics Design (4.0 cr)
EE 4161W - Energy Conversion and Storage [WI] (3.0 cr)
EE 4163 - Energy Conversion and Storage Laboratory (1.0 cr)
EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
EE 4233 - State Space Control System Design (3.0 cr)
EE 4235 - Linear Control Systems Laboratory (1.0 cr)
EE 4237 - State Space Control Laboratory (1.0 cr)
EE 4301 - Digital Design With Programmable Logic (4.0 cr)
EE 4303 - Introduction to Programmable Devices Laboratory (1.0 cr)
EE 4341 - Embedded System Design (4.0 cr)
EE 4363 - Computer Architecture and Machine Organization (4.0 cr)
EE 4389W - Introduction to Predictive Learning [WI] (3.0 cr)
EE 4501 - Communications Systems (3.0 cr)
EE 4505 - Communications Systems Laboratory (1.0 cr)
EE 4541 - Digital Signal Processing (3.0 cr)
EE 4607 - Wireless Hardware System Design (3.0 cr)
EE 4616 - Antennas: Theory, Analysis, and Design (3.0 cr)
EE 4701 - Electric Drives (3.0 cr)
EE 4703 - Electric Drives Laboratory (1.0 cr)
EE 4721 - Introduction to Power System Analysis (3.0 cr)
EE 4722 - Power System Analysis Laboratory (1.0 cr)
EE 4741 - Power Electronics (3.0 cr)
EE 4743 - Switch-Mode Power Electronics Laboratory (1.0 cr)
EE 5041 - Industrial Assignment for Graduate Students (1.0 cr)
EE 8190 - Electronics Seminar (1.0 cr)
EE 8210 - System Theory Seminar (1.0 cr)
EE 8230 - Control Theory Seminar (1.0 cr)
EE 8360 - Computer Systems Seminar (1.0 cr)
EE 8370 - Computer Aided Design Seminar (1.0 cr)
EE 8500 - Seminar: Communications (1.0 cr)
EE 8610 - Seminar: Electronics, Fields, and Photonics (1.0 cr)
EE 8660 - Seminar: Magnetics (1.0 cr)
EE 8920 - Teaching Experience in Electrical and Computer Engineering (1.0 cr)
EE 8925 - Ethics in Electrical and Computer Engineering (1.0 cr)
EE 8940 - Special Investigations (1.0 - 3.0 cr)
MOT 4001 - Leadership, Professionalism and Business Basics for Engineers (2.0 cr)

Thesis Credits
Take 24 doctoral thesis credits after passing preliminary oral exam.
EE 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Financial Mathematics M.F.M.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Program in Financial Mathematics, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: mcfam@umn.edu
Website: https://cse.umn.edu/mcfam/master-financial-mathematics-mfm

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 35
- This program does not require summer semesters for timely completion.
- Degree: Master of Financial Mathematics

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Financial Mathematics (MFM) degree program helps students understand the underlying mathematics of quantitative finance. The program offers a range of courses, from theoretical to practical, including a mathematical course on stochastic processes, a practitioner's course offering hands-on application of financial software tools, and a programming course focusing on Python and C#.

Courses are offered in the evenings to accommodate working professionals, and can be completed as a full- or part-time student.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited US university or foreign equivalent.

Other requirements to be completed before admission:
Applicants should have completed four semester college-level courses that cover single variable and multivariable calculus and linear algebra, a calculus-based probability course, and have the ability to write code in any programming language.

Students who do not have a strong mathematics background or who need a refresher may be asked to take FM 5001/5002 - Preparation for Financial Mathematics.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is February 1.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
**Program Requirements**

**Plan C:** Plan C requires 35 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

**Required Coursework (29 credits)**

Take the following courses. Take FM 5101 in fall of the first year and FM 5202 in spring of the first year.

- **FM 5101 - Current Events in Finance (1.0 cr)**
- **FM 5111 - Introduction to Financial Markets (3.0 cr)**
- **FM 5121 - Mathematics for Finance (3.0 cr)**
- **FM 5151 - Financial Modeling I: Python (3.0 cr)**
- **FM 5202 - Ethics in Finance (1.0 cr)**
- **FM 5212 - Continuous Time Finance (3.0 cr)**
- **FM 5222 - Statistical Methods in Finance (3.0 cr)**
- **FM 5252 - Financial Modeling II: Numerical Methods and Simulations (3.0 cr)**
- **FM 5323 - Data Science and Machine Learning in Finance (3.0 cr)**
- **FM 5343 - Quantitative Risk Management (3.0 cr)**
- **FM 5353 - Software Development in Finance (3.0 cr)**

**Elective Coursework (6 credits)**

Select 6 credits in consultation with the advisor.

- **FM 5422 - Quantitative Hedge Fund Strategies (2.0 cr)**
- **FM 5443 - Credit Risk Models (2.0 cr)**
- **FM 5462 - Market Microstructure (2.0 cr)**
Twin Cities Campus
Fundamentals of Quantitative Finance Postbaccalaureate Certificate
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Program in Financial Mathematics, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: mcfam@umn.edu
Website: https://cse.umn.edu/mcfam/fundamentals-quantitative-finance-fqf-post-baccalaureate-certificate

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Fundamentals of Quantitative Finance PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The 15-credit Fundamentals of Quantitative Finance (FQF) certificate is good preparation for the Financial Mathematics master's (MFM) program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited US university or foreign equivalent.

Other requirements to be completed before admission:
Applicants should have a good background in mathematics, but not necessarily at the level of a mathematics major. All applicants must have taken at least three semesters of college calculus, covering two semesters of single variable calculus and an additional semester of either multivariable calculus or linear algebra.

International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is May 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

**Required Courses (15 credits)**

Take the following courses:
- **FM 5001** - Preparation for Financial Mathematics I (3.0 cr)
- **FM 5002** - Preparation for Financial Mathematics II (3.0 cr)
- **FM 5111** - Introduction to Financial Markets (3.0 cr)
- **FM 5151** - Financial Modeling I: Python (3.0 cr)
- **FM 5252** - Financial Modeling II: Numerical Methods and Simulations (3.0 cr)
Twin Cities Campus
Geoengineering M.GeoE.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: https://cse.umn.edu/cege

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Geoengineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Geoengineering (MGeoE) degree is for the practicing engineer who would like to obtain an advanced degree enrolling part-time or full-time. Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing.

The MGeoE typically takes 2-3 semesters (12-18 months) to complete on a full-time basis or 6-8 semesters on a part-time basis. Students who intend to proceed to the PhD, or who think they may later wish to be admitted to the PhD, should apply for the Geoengineering MS program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An ABET-accredited, four-year bachelor's degree in engineering is required for admission.

Other requirements to be completed before admission:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The Plan C requires completion of 100 hours of project work and an oral presentation of no less than 10 minutes.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

Plan A students must complete a professional engineering design project in consultation with the advisor.

**Core Courses (12 to 30 credits)**

Select at least 12 credits from the following in consultation with the advisor. One credit of CEGE 8300 seminar may be applied to this requirement.

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<th>Course Title</th>
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<td>CEGE 4160</td>
<td>Special Topics</td>
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<td>CEGE 4201</td>
<td>Principles of Highway Design</td>
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<td>CEGE 4253</td>
<td>Pavement Design, Engineering, and Management</td>
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<td>CEGE 4411</td>
<td>Matrix Structural Analysis</td>
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<td>CEGE 4413</td>
<td>Steel Design II</td>
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<td>Pollutant Fate and Transport: Processes and Modeling</td>
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<td>CEGE 5213</td>
<td>Transit Planning and Management</td>
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<td>CEGE 5219</td>
<td>Air Transportation Systems</td>
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<td>Wave Methods for Nondestructive Testing</td>
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<td>CEGE 5342</td>
<td>Introduction to Inverse Problems</td>
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<td>Advanced Engineering Mathematics I</td>
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<td>Applied Structural Mechanics</td>
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<td>Urban Hydrology and Water Quality</td>
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<td>Energy Conversion from Wind, Hydro and Solar Resources</td>
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<td>Granular Physics with Environmental and Engineering Applications</td>
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<td>Remote Sensing of Environment and Water Resources</td>
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<td>Experimental Methods in Environmental Engineering</td>
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<td>CEGE 5543</td>
<td>Introductory Environmental Fluid Mechanics</td>
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<td>CEGE 5551</td>
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<td>CEGE 5570</td>
<td>Design for Sustainable Development - India</td>
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<tr>
<td>CEGE 8022</td>
<td>Numerical Methods for Free and Moving Boundary Problems</td>
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<td>CEGE 8094</td>
<td>Directed Research</td>
<td>1.0 – 4.0 cr</td>
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CEGE 8211 - Theory of Traffic Flow (4.0 cr)
CEGE 8212 - Advanced Travel Demand Modeling and Supply Analysis (3.0 cr)
CEGE 8213 - Advanced Transportation Technologies Seminar (1.0 cr)
CEGE 8214 - Transportation Economics (4.0 cr)
CEGE 8215 - Transportation Data Analysis (3.0 cr)
CEGE 8216 - Urban Traffic Operations (3.0 cr)
CEGE 8217 - Transportation Network Analysis (4.0 cr)
CEGE 8218 - Dynamic Transportation Network Analysis (4.0 cr)
CEGE 8231 - Advanced Pavement Engineering (3.0 cr)
CEGE 8300 - Seminar: Geomechanics (1.0 cr)
CEGE 8301 - Fracture of Geomaterials (3.0 cr)
CEGE 8302 - Soil/Rock Plasticity and Limit Analysis (4.0 cr)
CEGE 8311 - Advanced Rock Mechanics (3.0 cr)
CEGE 8321 - Thermoporoeleasticity (4.0 cr)
CEGE 8322 - Storage and Flow of Granular Materials (3.0 cr)
CEGE 8331 - Modeling Geomechanical Processes (3.0 cr)
CEGE 8336 - Boundary Element Methods I (3.0 cr)
CEGE 8337 - Boundary Element Methods II (3.0 cr)
CEGE 8341 - Wave Propagation in Solids and Structures (4.0 cr)
CEGE 8351 - Advanced Engineering Mathematics II (3.0 cr)
CEGE 8352 - Advanced Groundwater Mechanics II (3.0 cr)
CEGE 8361 - Engineering Model Fitting (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8411 - Plate Structures (3.0 cr)
CEGE 8412 - Shell Structures (3.0 cr)
CEGE 8413 - Fracture and Scaling (3.0 cr)
CEGE 8421 - Structural Dynamics (3.0 cr)
CEGE 8422 - Earthquake Engineering (3.0 cr)
CEGE 8431 - Structural Stability (3.0 cr)
CEGE 8432 - Analysis of Thin-Walled Members (3.0 cr)
CEGE 8441 - Ductile Behavior of Steel Structures (3.0 cr)
CEGE 8442 - Nonlinear Analysis of Structural Systems (3.0 cr)
CEGE 8443 - Fracture of Materials and Structures (3.0 cr)
CEGE 8451 - Behavior of Reinforced Concrete Structures (3.0 cr)
CEGE 8461 - Structural Reliability (3.0 cr)
CEGE 8490 - Special Topics (1.0 - 4.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8503 - Environmental Mass Transport (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CEGE 8506 - Stochastic Hydrology (4.0 cr)
CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
CEGE 8541 - Aquatic Chemistry (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8571 - Hydraulic Measurements (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)

Electives (0 to 8 credits)
Select courses from the following, in consultation with the advisor, to complete minimum course credit requirements. Students may complete one course from each of the following cross-listed pairs, but not both: PA 5231 or CEGE 5213; PA 5232 or CEGE 5212; WRS 8581 or CEGE 8581. Other courses may be selected with advisor and director of graduate studies approval.
AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)

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Information current as of November 07, 2022
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
ARCH 5391 - Design and Representation with BIM (3.0 cr)
ARCH 5671 - Historic Preservation (3.0 cr)
BEE 5302 - Biodegradation of Bioproducts (3.0 cr)
BEE 5513 - Watershed Engineering (3.0 cr)
BEE 5523 - Ecological Engineering Design (3.0 cr)
BEE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BEE 5753 - Air Quality and Pollution Control Engineering (3.0 cr)
BEE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CHEM 4214 - Polymers (3.0 cr)
CHEM 4601 - Green Chemistry [ENV] (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EEB 5068 - Plant Physiological Ecology (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
ESC 5801 - Geomicrobiology (3.0 cr)
ESPM 5071 - Ecological Restoration (4.0 cr)
ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
GCC 5005 - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5553 - Simulation (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
ME 5229 - Finite Element Method for Computational Mechanics: Transient/Dynamic Applications (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8332 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)
PA 5233 - Sustainable Transportation (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PMB 4111 - Microbial Physiology and Diversity (3.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
WRS 5101 - Water Policy (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
or CEGE 5213 - Transit Planning and Management (3.0 cr)
PA 5232 - Transportation Policy, Planning, and Deployment (3.0 cr)
or CEGE 5212 - Transportation Policy, Planning, and Deployment (3.0 cr)
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
or CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Plan Options

Plan A

Thesis Credits
Take 10 thesis credits for the professional engineering design project.
CEGE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Geoengineering M.S.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cgeoeps@umn.edu
Website: https://cse.umn.edu/cege

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Geoengineering master of science (MS) degree balances education in engineering fundamentals and design with research and development. It is designed for students wishing to pursue a career in industry or to continue toward a PhD. Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of communication, flow of granular materials, hydraulic fracturing, and nondestructive testing.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in engineering, basic science, or mathematics is preferred.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack geoengineering training are often required to complete at least one appropriate course from the undergraduate program. Graduate degree credit is not awarded for such preparatory work.

Special Application Requirements:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.  
**Capstone Project:** The Plan B requires completion of 1 to 3 Plan B papers as determined by the advisor. Up to 3 credits of CEGE 8094 may be applied to course credit requirements with advisor approval.

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.  
**Capstone Project:** The Plan C requires completion of 100 hours of project work and an oral presentation of no less than 10 minutes.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

**Core Courses (12 to 30 credits)**

Select at least 12 credits from the following in consultation with the advisor. One credit of CEGE 8300 seminar may be applied to this requirement.

Students may complete all their coursework from this list.  
CEGE 4160 - Special Topics (1.0 - 4.0 cr)  
CEGE 4201 - Principles of Highway Design (3.0 cr)  
CEGE 4253 - Pavement Design, Engineering, and Management (4.0 cr)  
CEGE 4411 - Matrix Structural Analysis (3.0 cr)  
CEGE 4412 - Reinforced Concrete II (3.0 cr)  
CEGE 4413 - Steel Design II (3.0 cr)  
CEGE 4511 - Hydraulic Structures (3.0 cr)  
CEGE 4512 - Open Channel Hydraulics (4.0 cr)  
CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)  
CEGE 4562 - Environmental Remediation Technologies (3.0 cr)  
CEGE 4563 - Pollutant Fate and Transport: Processes and Modeling (3.0 cr)  
CEGE 5094 - Directed Research (1.0 - 4.0 cr)  
CEGE 5180 - Special Topics (1.0 - 4.0 cr)  
CEGE 5211 - Traffic Engineering (3.0 cr)  
CEGE 5212 - Transportation Policy, Planning, and Deployment (3.0 cr)  
CEGE 5213 - Transit Planning and Management (3.0 cr)  
CEGE 5214 - Infrastructure Systems Engineering (3.0 cr)  
CEGE 5219 - Air Transportation Systems (3.0 cr)  
CEGE 5341 - Wave Methods for Nondestructive Testing (3.0 cr)  
CEGE 5342 - Introduction to Inverse Problems (3.0 cr)  
CEGE 5351 - Advanced Engineering Mathematics I (3.0 cr)  
CEGE 5411 - Applied Structural Mechanics (3.0 cr)  
CEGE 5414 - Prestressed Concrete Design (3.0 cr)  
CEGE 5415 - Masonry Structures (3.0 cr)  
CEGE 5416 - Sensors in Infrastructure (3.0 cr)  
CEGE 5417 - Structural Engineering Design of Wood Buildings (3.0 cr)  
CEGE 5511 - Urban Hydrology and Water Quality (4.0 cr)  
CEGE 5512 - Stochastic Ecohydrology (3.0 cr)  
CEGE 5513 - Energy Conversion from Wind, Hydro and Solar Resources (3.0 cr)  
CEGE 5514 - Granular Physics with Environmental and Engineering Applications (4.0 cr)  
CEGE 5515 - Remote Sensing of Environment and Water Resources (3.0 cr)  
CEGE 5541 - Environmental Water Chemistry (3.0 cr)  
CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)  
CEGE 5543 - Introductory Environmental Fluid Mechanics (4.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr)
CEGE 5552 - Environmental Microbiology Laboratory (1.0 cr)
CEGE 5570 - Design for Sustainable Development - India (3.0 - 9.0 cr)
CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
CEGE 8094 - Directed Research (1.0 - 4.0 cr)
CEGE 8211 - Theory of Traffic Flow (4.0 cr)
CEGE 8212 - Advanced Travel Demand Modeling and Supply Analysis (3.0 cr)
CEGE 8213 - Advanced Transportation Technologies Seminar (1.0 cr)
CEGE 8214 - Transportation Economics (4.0 cr)
CEGE 8215 - Transportation Data Analysis (3.0 cr)
CEGE 8216 - Urban Traffic Operations (3.0 cr)
CEGE 8217 - Transportation Network Analysis (4.0 cr)
CEGE 8218 - Dynamic Transportation Network Analysis (4.0 cr)
CEGE 8231 - Advanced Pavement Engineering (3.0 cr)
CEGE 8300 - Seminar: Geomechanics (1.0 cr)
CEGE 8301 - Fracture of Geomaterials (3.0 cr)
CEGE 8302 - Soil/Rock Plasticity and Limit Analysis (4.0 cr)
CEGE 8311 - Advanced Rock Mechanics (3.0 cr)
CEGE 8321 - Thermoporoelasticity (4.0 cr)
CEGE 8322 - Storage and Flow of Granular Materials (3.0 cr)
CEGE 8331 - Modeling Geomechanical Processes (3.0 cr)
CEGE 8336 - Boundary Element Methods I (3.0 cr)
CEGE 8337 - Boundary Element Methods II (3.0 cr)
CEGE 8341 - Wave Propagation in Solids and Structures (4.0 cr)
CEGE 8351 - Advanced Engineering Mathematics II (3.0 cr)
CEGE 8352 - Advanced Groundwater Mechanics II (3.0 cr)
CEGE 8361 - Engineering Model Fitting (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8411 - Plate Structures (3.0 cr)
CEGE 8412 - Shell Structures (3.0 cr)
CEGE 8413 - Fracture and Scaling (3.0 cr)
CEGE 8421 - Structural Dynamics (3.0 cr)
CEGE 8422 - Earthquake Engineering (3.0 cr)
CEGE 8431 - Structural Stability (3.0 cr)
CEGE 8432 - Analysis of Thin-Walled Members (3.0 cr)
CEGE 8441 - Ductile Behavior of Steel Structures (3.0 cr)
CEGE 8442 - Nonlinear Analysis of Structural Systems (3.0 cr)
CEGE 8443 - Fracture of Materials and Structures (3.0 cr)
CEGE 8451 - Behavior of Reinforced Concrete Structures (3.0 cr)
CEGE 8461 - Structural Reliability (3.0 cr)
CEGE 8490 - Special Topics (1.0 - 4.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8503 - Environmental Mass Transport (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CEGE 8506 - Stochastic Hydrology (4.0 cr)
CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
CEGE 8541 - Aquatic Chemistry (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8571 - Hydraulic Measurements (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)

Electives (0 to 18 credits)
Select credits from the following, in consultation with the advisor, to complete the minimum number of course credits required. Students may complete one course from each of the following cross-listed pairs, but not both: PA 5231 or CEGE 5213; PA 5232 or
CEGE 5212; WRS 8581 or CEGE 8581. Other courses may be selected with advisor and director of graduate studies approval.

AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8533 - Theory of Plasticity (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
ARCH 5391 - Design and Representation with BIM (3.0 cr)
ARCH 5671 - Historic Preservation (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
BBE 5513 - Watershed Engineering (3.0 cr)
BBE 5523 - Ecological Engineering Design (3.0 cr)
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BBE 5753 - Air Quality and Pollution Control Engineering (3.0 cr)
BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
CHEM 4214 - Polymers (3.0 cr)
CHEM 4601 - Green Chemistry [ENV] (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EEB 5068 - Plant Physiological Ecology (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
ESCI 8801 - Geomicrobiology (3.0 cr)
ESPM 5071 - Ecological Restoration (4.0 cr)
ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
GCC 5005 - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
Plan Options

Plan A
Thesis Credits
- Take 10 master’s thesis credits.
  - CEGE 8777 - Thesis Credits: Master’s (1.0 - 18.0 cr)
- OR-

Plan B (0-3 credits)
- Take the following as needed per direction of the advisor. If taken, up to 3 credits can be applied to the course-credit requirement.
  - CEGE 8094 - Directed Research (1.0 - 4.0 cr)

Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Integrated B.GeoE./M.S. - Geoeengineering
The department offers an integrated Bachelor of Geoeengineering (BGeoE) and master of science (MS) in geoeengineering. The integrated BGeoE/MS program offers students the opportunity to earn the bachelors and masters degree in five years. These programs offer several benefits: streamlined admissions from the undergraduate to the graduate program (GRE not required); flexibility in fulfilling required courses for both degrees during the senior year (up to 16 credits can be applied to the graduate program); and eligibility for

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teaching and research assistantships. Eligibility requirements for the integrated program: Application is open to University BGeoE undergraduates who:
- are within 32 credits of completing the requirements for the bachelors degree;
- have a faculty advisor selected prior to admission; and
- hold a cumulative GPA of 3.3 or higher.

Both the BGeoE and MS degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MS degree are permitted to count credits originally planned for the graduate program toward their BGeoE technical electives.

**Integrated B.C.E./M.S. - Geoengineering**
The department offers an integrated bachelor of civil engineering (BCE) and master of science (MS) in geoengineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the BGeoE/MS integrated program also apply to the BCE/MS.

**Integrated B.Env.E./M.S. - Geoengineering**
The department offers an integrated bachelor of environmental engineering (BEnvE) and master of science (MS) in geoengineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the BGeoE/MS integrated program also apply to the BEnvE/MS.

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Information current as of November 07, 2022
Twin Cities Campus
Geoengineering Minor
CSENG Civil, Envnr & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegeps@umn.edu
Website: https://cse.umn.edu/cege

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Geoengineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Minor Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor and the Geoengineering director of graduate studies:
CEGE 5341 - Wave Methods for Nondestructive Testing (3.0 cr)
CEGE 5342 - Introduction to Inverse Problems (3.0 cr)
CEGE 5351 - Advanced Engineering Mathematics I (3.0 cr)
CEGE 8301 - Fracture of Geomaterials (3.0 cr)
CEGE 8302 - Soil/Rock Plasticity and Limit Analysis (4.0 cr)
CEGE 8311 - Advanced Rock Mechanics (3.0 cr)
CEGE 8321 - Thermoporoelasticity (4.0 cr)
CEGE 8322 - Storage and Flow of Granular Materials (3.0 cr)
CEGE 8331 - Modeling Geomechanical Processes (3.0 cr)
CEGE 8336 - Boundary Element Methods I (3.0 cr)
CEGE 8337 - Boundary Element Methods II (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
**Twin Cities Campus**

**Industrial and Systems Engineering M.S.I.S.Y.E.**

**Industrial and Systems Engineering**

**College of Science and Engineering**

Link to a [list of faculty](#) for this program.

**Contact Information:**

Industrial and Systems Engineering Graduate Program, University of Minnesota, 100 Union Street SE, Minneapolis, MN 55455 (612-624-1582; fax 612-624-0944)

Email: isye@umn.edu

Website: [https://cse.umn.edu/isye/](https://cse.umn.edu/isye/)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Industrial & Systems Engr

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Industrial and Systems Engineering (ISyE) MS program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

MS students can pursue one of three tracks: Analytics, Industrial Engineering, or Systems Engineering.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in engineering or a closely related field is required.

**Special Application Requirements:**

All application materials are submitted electronically through the Graduate Admissions Office. The application must include the intended track.

- **Analytics Track:**
  - The GRE is required.
  - Personal statement
  - Three letters of recommendation (required for financial aid consideration only)
  - Students are admitted fall semester only. The application deadline is February 15.

- **Industrial Engineering Track:**
  - The GRE is required.
  - Personal statement
  - Three letters of recommendation (required for financial aid consideration only)
  - Application deadlines are February 15 for fall semester and October 15 for spring semester.

- **Systems Engineering Track:**
  - The GRE is not required.
  - A minimum two years of professional work experience in a technical field is required; however, promising candidates with less experience will be considered under exceptional circumstances
  - Personal statement
  - Three letters of recommendation
  - Application deadlines are February 15 for fall semester and October 15 for spring semester.
Applicants must submit their test score(s) from the following:

- **GRE**

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

**Plan C:** Plan C requires 24 to 30 major credits and 0 to 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

In order to fulfill the University’s graduate education policy regarding research ethics training, students are required to take an online research ethics training course through the CITI program, or a qualifying equivalent.

Analytics track: Non-native English speakers must take ESL 5008 (2 credits). ESL 5008 cannot be applied to degree requirements.

**Joint- or Dual-degree Coursework:** MSISyE/MS-Civil Engineering (Transportation Engineering Focus) Student may take a total of 15 credits in common among the academic programs.

**Program Sub-plans**

Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

**Analytics**

This sub-plan is limited to students completing the program under Plan C.

**Required Courses (24 credits)**

Take the following courses. Select CSCI 5521 or CSCI 5523 in consultation with the advisor. Students not in the Integrated B.ISyE/M.S.ISyE program take IE 5532. Students in the Integrated B.ISyE/M.S.ISyE program take IE 5545.

- IE 5531 - Engineering Optimization I (4.0 cr)
- IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
- IE 5773 - Practice-focused Seminar (1.0 cr)
- IE 5801 - Capstone Project (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- IE 5532 - Stochastic Models (4.0 cr)
  - or IE 5545 - Decision Analysis (4.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
  - or CSCI 5523 - Introduction to Data Mining (3.0 cr)
Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other credits may be chosen with advisor and director of graduate studies approval.
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
IE 5441 - Financial Decision Making (4.0 cr)
IE 5522 - Quality Engineering and Reliability (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5553 - Simulation (4.0 cr)
IE 5571 - Reinforcement Learning and Dynamic Programming (4.0 cr)
IE 8564 - Optimization for Machine Learning (4.0 cr)
MABA 6321 - Data Management and Big Data (2.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Industrial Engineering
Required Courses (12 to 16 credits)
Take the following courses:
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
Plan A students select 4 credits, and Plan B and Plan C students select at least 8 credits from the following in consultation with the advisor:
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
Seminar (1 credit)
Select 1 of the following seminars in consultation with the advisor. Other seminars may be chosen with advisor approval.
IE 5773 - Practice-focused Seminar (1.0 cr)
IE 8773 - Graduate Seminar (1.0 cr)
IE 8774 - Graduate Seminar (1.0 cr)

Outside Courses (6 credits)
Select at least 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5751 - Big Data Engineering and Architecture (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
ECON 8117 - Noncooperative Game Theory (2.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MBA 6031 - Financial Accounting (3.0 cr)
MBA 6221 - Supply Chain & Operations (3.0 cr)
MGMT 6004 - Negotiation Strategies (2.0 cr)
MILI 6985 - The Health Care Marketplace (2.0 cr)
MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
SCO 6041 - Project Management (2.0 cr)
SCO 6056 - Managing Supply Chain Operations (4.0 cr)
SCO 6059 - Quality Management and Lean Six Sigma (4.0 cr)
SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)

Electives
Plan A students select credits as needed to meet the 20 course credits required for the degree, Plan B students select credits as needed to meet the 30-credit minimum, and Plan C students select credits as needed to meet the 32-credit minimum. The number of Plan B credits will be dependent upon how the 4-credit Plan B Project requirement is satisfied. Credits are selected in consultation with the advisor.

IE 5080 - Topics in Industrial Engineering (1.0 - 4.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5441 - Financial Decision Making (4.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5513 - Engineering Safety (4.0 cr)
IE 5522 - Quality Engineering and Reliability (4.0 cr)
IE 5524 - Process Transformation through Lean Tools (2.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5553 - Simulation (4.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
IE 5571 - Reinforcement Learning and Dynamic Programming (4.0 cr)
IE 5801 - Capstone Project (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
IE 8533 - Advanced Stochastic Processes and Queuing Systems (4.0 cr)
IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
IE 8552 - Advanced Topics in Production, Inventory, and Distribution Systems (4.0 cr)
IE 8564 - Optimization for Machine Learning (4.0 cr)

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
IE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Project Credits (0 to 4 credits)
Complete the Plan B project/paper. Take 0-4 credits of the following in consultation with the advisor.
IE 8794 - Industrial Engineering Research (1.0 - 6.0 cr)

Systems Engineering
This sub-plan is limited to students completing the program under Plan C.

Required Courses (14 credits)
Take the following courses:
IE 5111 - Systems Engineering I (2.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE 5113</td>
<td>Systems Engineering II (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>IE 5541</td>
<td>Project Management (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>IE 5553</td>
<td>Simulation (4.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>

**Outside Courses (6 credits)**
Select at least 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.

- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
- ECON 8117 - Noncooperative Game Theory (2.0 cr)
- HINF 5430 - Foundations of Health Informatics I (3.0 cr)
- HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
- MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
- MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
- MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
- MBA 6031 - Financial Accounting (3.0 cr)
- MBA 6221 - Supply Chain & Operations (3.0 cr)
- MGMT 6004 - Negotiation Strategies (2.0 cr)
- MILI 6985 - The Health Care Marketplace (2.0 cr)
- MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
- MOT 5001 - Technological Business Fundamentals (2.0 cr)
- MOT 5002 - Creating Technological Innovation (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- SCO 6041 - Project Management (2.0 cr)
- SCO 6056 - Managing Supply Chain Operations (4.0 cr)
- SCO 6059 - Quality Management and Lean Six Sigma (4.0 cr)
- SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)

**Electives**
Select credits as needed from the following, in consultation with the advisor, to complete the 30-credit minimum.

- IE 5080 - Topics in Industrial Engineering (1.0 - 4.0 cr)
- IE 5441 - Financial Decision Making (4.0 cr)
- IE 5513 - Engineering Safety (4.0 cr)
- IE 5522 - Quality Engineering and Reliability (4.0 cr)
- IE 5524 - Process Transformation through Lean Tools (2.0 cr)
- IE 5531 - Engineering Optimization I (4.0 cr)
- IE 5532 - Stochastic Models (4.0 cr)
- IE 5545 - Decision Analysis (4.0 cr)
- IE 5551 - Production and Inventory Systems (4.0 cr)
- IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
- IE 5571 - Reinforcement Learning and Dynamic Programming (4.0 cr)
- IE 5773 - Practice-focused Seminar (1.0 cr)
- IE 5801 - Capstone Project (4.0 cr)
- IE 8521 - Optimization (4.0 cr)
- IE 8531 - Discrete Optimization (4.0 cr)
- IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
- IE 8533 - Advanced Stochastic Processes and Queuing Systems (4.0 cr)
- IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
- IE 8552 - Advanced Topics in Production, Inventory, and Distribution Systems (4.0 cr)

**Integrated B.I.Sy.E./M.S.I.Sy.E.**
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

This sub-plan is limited to students completing the program under Plan C.
The Department of Industrial and Systems Engineering offers an integrated bachelor's/master's degree program. The program makes it possible for students to earn both a bachelor's degree (BISyE) and a master's degree (MSISyEAnalytics track) in Industrial and Systems Engineering in five years. The program has several benefits: a streamlined admissions process from the undergraduate to the graduate program; graduate student status granted in the senior year; eligibility for teaching and research assistantships; and flexibility in fulfilling required courses for both degrees in the last two years of study. Applicants must be enrolled in the ISyE undergraduate program at the University of MinnesotaTwin Cities and have a minimum cumulative GPA of at least 3.4 or a strong letter of recommendation from an ISyE faculty member. The following IE courses must be completed or in progress at the time of application: 1101, 2021, 3011, 3012, 3521, 3522, 4011, and 4551.

The BISyE and MSISyE degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MSISyE degree are permitted to count credits originally planned for the graduate program toward their undergraduate technical electives.
Twin Cities Campus
Industrial and Systems Engineering Minor
Industrial and Systems Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 100 Union Street SE, Minneapolis, MN 55455 (612-624-1582; fax: 612-624-0944)
Email: isye@umn.edu
Website: https://cse.umn.edu/isye/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Industrial and Systems Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Minor Coursework (6 to 12 credits)
Master’s students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Industrial and Systems Engineering director of graduate studies. Other courses may be chosen with minor director of graduate studies approval.

IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
IE 5571 - Reinforcement Learning and Dynamic Programming (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queueing Systems (4.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Industrial and Systems Engineering Ph.D.
Industrial and Systems Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 100 Union Street SE, Minneapolis, MN 55455 (612-624-1582; fax: 612-624-0944)
Email: isye@umn.edu
Website: http://cse.umn.edu/isye/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Industrial and Systems Engineering (ISyE) PhD program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in engineering or a closely related field is required.

Special Application Requirements:
All application materials should be submitted electronically through the online application system.

The application deadlines are December 15 for fall semester and October 15 for spring semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
32 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

In order to fulfill the University's graduate education policy regarding research ethics training, students are required to take an online research ethics training course through the CITI program, or a qualifying equivalent.

**Required Courses (12 credits)**
Take the following courses:
- IE 8521 - Optimization (4.0 cr)
- IE 8532 - Stochastic Processes and Queueing Systems (4.0 cr)
- IE 8554 - Advanced Production and Inventory Systems (4.0 cr)

**Seminars (2 credits)**
Take 2 seminar credits from the following in consultation with the advisor. Other seminars may be applied to this requirement with advisor approval.
- IE 8773 - Graduate Seminar (1.0 cr)
- IE 8774 - Graduate Seminar (1.0 cr)

**8000-level IE Coursework (8 credits)**
Complete a minimum of 8 credits from the following, in consultation with the advisor.
- IE 8531 - Discrete Optimization (4.0 cr)
- IE 8533 - Advanced Stochastic Processes and Queueing Systems (4.0 cr)
- IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
- IE 8535 - Introduction to Network Science (4.0 cr)
- IE 8536 - Advanced Topics in Engineering Management (4.0 cr)
- IE 8538 - Advanced Topics in Information Systems (4.0 cr)
- IE 8541 - Decision Support Systems (4.0 cr)
- IE 8552 - Advanced Topics in Production, Inventory, and Distribution Systems (4.0 cr)
- IE 8564 - Optimization for Machine Learning (4.0 cr)
- IE 8571 - Advanced Reinforcement Learning and Dynamic Programming (4.0 cr)

**Electives (0 to 10 credits)**
Select coursework from the following, in consultation with the advisor. Other courses may be selected with the advisor and director of graduate studies approval.
- IE 5080 - Topics in Industrial Engineering (1.0 - 4.0 cr)
- IE 5511 - Human Factors and Work Analysis (4.0 cr)
- IE 5513 - Engineering Safety (4.0 cr)
- IE 5522 - Quality Engineering and Reliability (4.0 cr)
- IE 5545 - Decision Analysis (4.0 cr)
- IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
- IE 8531 - Discrete Optimization (4.0 cr)
- IE 8533 - Advanced Stochastic Processes and Queueing Systems (4.0 cr)
- IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)
- IE 8535 - Introduction to Network Science (4.0 cr)
- IE 8536 - Advanced Topics in Engineering Management (4.0 cr)
- IE 8538 - Advanced Topics in Information Systems (4.0 cr)
- IE 8541 - Decision Support Systems (4.0 cr)
- IE 8552 - Advanced Topics in Production, Inventory, and Distribution Systems (4.0 cr)
- IE 8564 - Optimization for Machine Learning (4.0 cr)
- IE 8571 - Advanced Reinforcement Learning and Dynamic Programming (4.0 cr)
- IE 8794 - Industrial Engineering Research (1.0 - 6.0 cr)

**Outside Coursework (12 to 22 credits)**
Select a minimum of 12 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Introduction to Data Mining (3.0 cr)
CSCI 5526 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8117 - Noncooperative Game Theory (2.0 cr)
ECON 8118 - Noncooperative Game Theory (2.0 cr)
ECON 8119 - Cooperative Game Theory (2.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
MATH 5654 - Prediction and Filtering (4.0 cr)
MATH 5707 - Graph Theory and Nonenumerative Combinatorics (4.0 cr)
MATH 8540 - Topics in Mathematical Biology (1.0 - 3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8659 - Stochastic Processes (3.0 cr)
PSYCH 7475 - Statistical Learning and Data Mining (3.0 cr)
PSYCH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)
STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)

Thesis Credits (24 credits)
Take 24 doctoral thesis credits after passing preliminary oral exam.
IE 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Industrial Engineering
Twin Cities Campus
Management of Technology M.S.M.O.T.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
(612-624-5474; fax: 612-624-7510)
Email: MOT@umn.edu
Website: https://cse.umn.edu/tli

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 35
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Management of Technology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Management of Technology (MSMOT) is a two-year, executive-format program that integrates the fields of technology and management and provides working engineers, scientists, and other professionals with management knowledge and skills needed to become successful technology leaders and innovators across all business and industry sectors. The program focuses on management in technology-based environments in traditional and emerging industries. The curriculum includes technical and advanced management courses, such as pivotal technologies, technology forecasting, project management, management of innovation, intellectual property management, and strategic management of technology. The core management curriculum includes areas such as finance, marketing, accounting, strategic planning and decision making, and conflict management. Students proceed through the program and advance as a cohort, taking a prescribed sequence of courses together. Case studies, class discussions, and study-group interaction stimulate the learning process. Students also participate in off-campus residencies, including an international residency; complete individual and team projects; and develop final projects as part of a capstone course. Most students receive corporate financial support.

The program is offered in a format designed for full-time working professionals. Students take courses one day per week on alternating Fridays and Saturdays and complete the degree within two years.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree from an accredited program.

Other requirements to be completed before admission:
Applicants should have at least 5 years of professional experience in a technical field.

In exceptional circumstances, promising candidates with less experience may be considered.

Special Application Requirements:
The program accepts applications on a rolling basis for fall semester of each year.

Applicants must submit three letters of recommendation, a resume, and a statement of purpose.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 83

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 35 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The capstone project consists of an independent, original investigation requiring between 110 and 130 hours of effort. Students use concepts and methods learned in the MOT program to research and develop an industry-based product, project, process, or venture. The capstone project enables students to directly apply their MOT education at work.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Students attend the program as a cohort and complete their studies in four semesters.

Required Courses (32.5 Credits)

Complete the following courses for a total of 32.5 credits. Take 2 credits of MOT 8960: 1 credit fall of year 2 and 1 credit spring of year 2.

MOT 8111 - Marketing Management for Technology-based Organizations (2.0 cr)
MOT 8112 - Accounting for Decision Making (1.5 cr)
MOT 8113 - Operations Management for Competitive Advantage (1.5 cr)
MOT 8114 - Strategic Technology Analysis (1.5 cr)
MOT 8121 - Managing Organizations in a Technological Environment (1.5 cr)
MOT 8122 - Financial Management for Technology-based Organizations (1.5 cr)
MOT 8133 - Managerial Communication for Technological Leaders: Persuasive Writing and Speaking (2.0 cr)
MOT 8212 - Developing New Technology Products and Services (2.0 cr)
MOT 8214 - Technology Foresight and Forecasting (2.0 cr)
MOT 8218 - Digital Transformation (1.0 cr)
MOT 8221 - Project and Knowledge Management (1.5 cr)
MOT 8224 - Pivotal Technologies (1.0 cr)
MOT 8232 - Managing Technological Innovation (2.0 cr)
MOT 8233 - Strategic Management of Technology (2.0 cr)
MOT 8501 - Leading Individual & Team Performance (1.5 cr)
MOT 8502 - Innovation Leadership and Organizational Effectiveness (1.0 cr)
MOT 8900 - Conflict Management (0.5 cr)
MOT 8920 - Science and Technology Policy (1.5 cr)
MOT 8940 - Managing Intellectual Property (1.0 cr)
MOT 8950 - International Management of Technology Project (2.0 cr)
MOT 8960 - Seminars in Management of Technology (MOT) and Innovation (1.0 cr)

Capstone Project (2.5 Credits)

Take a total of 2.5 credits of MOT 8234: .5 credits in fall of year 2, and 2 credits spring of year 2.

MOT 8234 - Capstone Project (0.5 - 2.5 cr)
Twin Cities Campus
Management of Technology Minor
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, College of Science and Engineering, University of Minnesota, Suite 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
Phone: 612-624-5747
Fax: 612-624-7510
Email: mot@umn.edu
Website: https://cse.umn.edu/tli

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Management of Technology minor integrates the fields of technology and management, allowing students in science and engineering majors to develop understanding and expertise in business principles. The curriculum includes basic business knowledge, with an emphasis on technology-intensive organizations. Topics include strategy, finance, marketing, intellectual property, innovation, and technology planning. Each class will include exercises that inform students on those business topics, and give them an opportunity to practice the fundamental skills of communications, teamwork, and project management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Management of Technology (MOT) director of graduate studies regarding feasibility and requirements. Approval of the MOT director of graduate studies to pursue the minor is required.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

MOT minor courses cannot be applied to Master of Science in Management of Technology degree requirements.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Core Courses (4 credits)
Take the following courses:
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)

Electives (2 to 8 credits)
Master's students select 2 credits, and doctoral students select 8 credits in consultation with the MOT director of graduate studies to
complete credit requirements. Other courses may be counted toward the MOT minor with prior approval by the MOT director of graduate studies.

ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
ENTR 6036 - Managing the Growing Business (2.0 cr)
HSCI 5401 - Ethics in Science and Technology (3.0 cr)
HSCI 5421 - Engineering Ethics (3.0 cr)
IDSC 6041 - Information Technology Management (2.0 cr)
IDSC 6423 - Enterprise Systems (2.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5441 - Financial Decision Making (4.0 cr)
IE 5541 - Project Management (4.0 cr)
MBA 6111 - Leading Others (2.0 cr)
MBA 6301 - Strategic Management (3.0 cr)
ME 8221 - New Product Design and Business Development I (4.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
MGMT 6004 - Negotiation Strategies (2.0 cr)
MGMT 6041 - Competing Globally (2.0 cr)
MGMT 6084 - Management of Teams (2.0 cr)
MGMT 6305 - The International Environment of Business (4.0 cr)
MOT 5003 - Technological Business Planning Workshop (1.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5741 - Risk, Resilience and Decision Making (1.5 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Materials Science and Engineering M.Mat.S.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Materials Science And Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Materials Science and Engineering (MMatSE), also known as the professional master's, is designed for working professionals who are interested in obtaining a master's degree part-time. Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

Other requirements to be completed before admission:
The professional master's in engineering degree is designed for employees of local industries who wish to pursue their studies part-time. No financial support is available. Applicants should contact the program before applying for admission.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement summarizing research/work experience and motivation for graduate work.

Applications are accepted for fall semester only. December 15 is the application deadline; late applications are considered if space is available.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
• MELAB
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Use of 4xxx courses requires director of graduate studies approval.

A work-related MMatSE design project, completed in consultation with the advisor, is required.

**Core Courses (12 credits)**

Select 12 credits from the following in consultation with the advisor:

- **MATS 8001** - Structure and Symmetry of Materials (3.0 cr)
- **MATS 8002** - Thermodynamics and Kinetics (3.0 cr)
- **MATS 8003** - Electronic Properties (3.0 cr)
- **MATS 8004** - Mechanical Properties (3.0 cr)
- **MATS 8201** - Applied Math (3.0 cr)
- **MATS 8301** - Physical Rate Processes I: Transport (3.0 cr)

**Electives**

Select elective courses from the following to complete the 14-credit minimum for the major. Other courses can be selected with advisor and director of graduate studies approval.

- **MATS 4214** - Polymers (3.0 cr)
- **MATS 5517** - Microscopy of Materials (3.0 cr)
- **MATS 5531** - Electrochemical Engineering (3.0 cr)
- **MATS 5771** - Colloids and Dispersions (3.0 cr)
- **MATS 5801** - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
- **MATS 5803** - Chemical and Materials Technology Commercialization (3.0 cr)
- **MATS 8103** - Scattering from Soft Matter (2.0 cr)
- **MATS 8201** - Applied Math (3.0 cr)
- **MATS 8211** - Physical Chemistry of Polymers (4.0 cr)
- **MATS 8217** - Transmission Electron Microscopy (3.0 cr)
- **MATS 8221** - Synthetic Polymer Chemistry (4.0 cr)
- **MATS 8301** - Physical Rate Processes I: Transport (3.0 cr)
- **MATS 8995** - Special Topics (1.0 - 4.0 cr)

**Outside Coursework (6 credits)**

Select 6 credits from the following in consultation with the advisor. Other courses can be applied to this requirement with advisor and director of graduate studies approval.

- **AEM 4511** - Mechanics of Composite Materials (3.0 cr)
- **AEM 5321** - Modern Feedback Control (3.0 cr)
- **AEM 5451** - Optimal Estimation (3.0 cr)
- **AEM 5501** - Continuum Mechanics (3.0 cr)
- **AEM 5503** - Theory of Elasticity (3.0 cr)
- **AEM 5581** - Mechanics of Solids (3.0 cr)
- **AEM 8201** - Fluid Mechanics I (3.0 cr)
- **AEM 8202** - Fluid Mechanics II (3.0 cr)
- **AEM 8203** - Fluid Mechanics III (3.0 cr)
- **AEM 8251** - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- **AEM 8421** - Robust Multivariable Control Design (3.0 cr)
- **AEM 8423** - Convex Optimization Methods in Control (3.0 cr)
<table>
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<th>Course Title</th>
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<td>Multiscale Methods for Bridging Length and Time Scales</td>
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<td>BBE 5001</td>
<td>Chemistry of Biomass and Biomass Conversion to Fuels and Products</td>
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<td>Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression</td>
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<td>BMEN 5001</td>
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<td>BMEN 5041</td>
<td>Tissue Engineering</td>
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<td>Introduction to BioMEMS and Medical Microdevices</td>
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<td>Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models</td>
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<td>Mechanisms of Chemical Reactions</td>
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<td>Computational Chemistry</td>
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<td>Analytical Separations and Chemical Equilibria</td>
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<td>Interpretation of Organic Spectra</td>
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<td>Introduction to Rheology</td>
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<td>Micro and Nanotechnology by Self Assembly</td>
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<td>Optimal Filtering and Estimation</td>
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<td>Probability and Stochastic Processes</td>
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<td>EE 5561</td>
<td>Image Processing and Applications: From linear filters to artificial intelligence</td>
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<td>Physical Optics Laboratory</td>
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<td>EE 5624</td>
<td>Optical Electronics</td>
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<td>Introduction to Nano-Optics</td>
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<td>EE 5653</td>
<td>Physical Principles of Magnetic Materials</td>
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<td>EE 5655</td>
<td>Magnetic Recording</td>
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<td>EE 5657</td>
<td>Physical Principles of Thin Film Technology</td>
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<td>EE 8161</td>
<td>Physics of Semiconductors</td>
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<td>EE 8231</td>
<td>Optimization Theory</td>
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<td>ESCI 5353</td>
<td>Electron Microprobe Theory and Practice</td>
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<tr>
<td>IE 8532</td>
<td>Stochastic Processes and Queuing Systems</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 4428</td>
<td>Mathematical Modeling</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 4512</td>
<td>Differential Equations with Applications</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MATH 5445</td>
<td>Mathematical Analysis of Biological Networks</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 5485</td>
<td>Introduction to Numerical Methods I</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 5486</td>
<td>Introduction To Numerical Methods II</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 5525</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 5535</td>
<td>Dynamical Systems and Chaos</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 5587</td>
<td>Elementary Partial Differential Equations I</td>
<td>4.0 cr</td>
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<tr>
<td>MATH 5588</td>
<td>Elementary Partial Differential Equations II</td>
<td>4.0 cr</td>
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<tr>
<td>MATH 5651</td>
<td>Basic Theory of Probability and Statistics</td>
<td>4.0 cr</td>
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<tr>
<td>MATH 5652</td>
<td>Introduction to Stochastic Processes</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>MATH 8401</td>
<td>Mathematical Modeling and Methods of Applied Mathematics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MATH 8441</td>
<td>Numerical Analysis and Scientific Computing</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MATH 8442</td>
<td>Numerical Analysis and Scientific Computing</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>ME 5113</td>
<td>Aerosol/Particle Engineering</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>ME 5228</td>
<td>Introduction to Finite Element Modeling, Analysis, and Design</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>ME 5247</td>
<td>Applied Stress Analysis</td>
<td>4.0 cr</td>
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<tr>
<td>ME 5446</td>
<td>Introduction to Combustion</td>
<td>4.0 cr</td>
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<tr>
<td>ME 8341</td>
<td>Conduction</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MEDC 8753</td>
<td>MOLECULAR TARGETS OF DRUG DISCOVERY</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MICA 8002</td>
<td>Structure, Function, and Genetics of Bacteria and Viruses</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PHYS 5001</td>
<td>Quantum Mechanics I</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PHYS 5002</td>
<td>Quantum Mechanics II</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PHYS 5081</td>
<td>Introduction to Biopolymer Physics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PHYS 5201</td>
<td>Thermal and Statistical Physics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PHYS 5701</td>
<td>Solid-State Physics for Engineers and Scientists</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PHYS 8001</td>
<td>Advanced Quantum Mechanics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PHYS 8702</td>
<td>Statistical Mechanics and Transport Theory</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PHYS 8711</td>
<td>Solid-State Physics I</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PHYS 8712</td>
<td>Solid-State Physics II</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 5021</td>
<td>Statistical Analysis</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 5303</td>
<td>Designing Experiments</td>
<td>4.0 cr</td>
</tr>
</tbody>
</table>
STAT 5601 - Nonparametric Methods (3.0 cr)

Thesis Credits
Take 10 master's thesis credits for the professional engineering design project.
MATS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Materials Science and Engineering M.S.Mat.S.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science Materials Science And Engr

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

Other requirements to be completed before admission:
CEMS does not admit directly to the MSMatSE Plan A (with thesis) for full-time study with support.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement summarizing research/work experience and motivation for graduate work.

Applications are accepted for fall semester only. December 15 is the application deadline; late applications are considered if space is available.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of November 07, 2022
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan C: Plan C requires 18 major credits and 12 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Use of 4xxx courses requires director of graduate studies approval.

Core Courses (12 credits)
Select 12 credits from the following in consultation with the advisor:
- MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- MATS 8004 - Mechanical Properties (3.0 cr)
- MATS 8201 - Applied Math (3.0 cr)
- MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)

Electives
Select electives from the following, in consultation with the advisor, to meet the minimum number of course credits required for the major field. Other courses can be selected with director of graduate studies approval.
- MATS 4214 - Polymers (3.0 cr)
- MATS 5517 - Microscopy of Materials (3.0 cr)
- MATS 5531 - Electrochemical Engineering (3.0 cr)
- MATS 5771 - Colloids and Dispersions (3.0 cr)
- MATS 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
- MATS 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
- MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- MATS 8004 - Mechanical Properties (3.0 cr)
- MATS 8103 - Scattering from Soft Matter (2.0 cr)
- MATS 8201 - Applied Math (3.0 cr)
- MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
- MATS 8217 - Transmission Electron Microscopy (3.0 cr)
- MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
- MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)
- MATS 8995 - Special Topics (1.0 - 4.0 cr)

Outside Coursework (6 to 12 credits)
Plan A students select at least 6 credits, and Plan C students select at least 12 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.

AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8203 - Fluid Mechanics III (3.0 cr)
AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
AEM 8525 - Elastic Stability of Materials (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
AEM 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5041 - Tissue Engineering (3.0 cr)
BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
BMEN 8001 - Polymeric Biomaterials (3.0 cr)
BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
BMEN 8551 - Systems and Synthetic Biology (3.0 cr)
CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEN 4214 - Polymers (3.0 cr)
CHEN 5751 - Biochemical Engineering (3.0 cr)
CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
CHEN 5771 - Colloids and Dispersions (3.0 cr)
CHEN 5801 - Optimization in Chemical and Energy Systems Engineering (3.0 cr)
CHEN 5803 - Chemical and Materials Technology Commercialization (3.0 cr)
CHEN 8101 - Fluid Mechanics (3.0 cr)
CHEN 8102 - Introduction to Rheology (2.0 cr)
CHEN 8104 - Coating Process Fundamentals (2.0 cr)
CHEN 8201 - Applied Math (3.0 cr)
CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Micro and Nanotechnology by Self Assembly (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5640 - Introduction to Nano-Ops (3.0 cr)
EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology (4.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
FSCN 8314 - Food Materials Science (2.0 cr)
GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queueing Systems (4.0 cr)
MATH 4428 - Mathematical Modeling (4.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 8341 - Conduction (3.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)  
STAT 5021 - Statistical Analysis (4.0 cr)  
STAT 5303 - Designing Experiments (4.0 cr)  
STAT 5601 - Nonparametric Methods (3.0 cr)

Plan Options

Plan A

Thesis Credits

Take 10 master's thesis credits.  
MATS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Materials Science and Engineering Minor

Chemical Engineering & Materials Science

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Materials Science and Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor must be approved by the director of graduate studies in Materials Science and Engineering.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Minor Courses (6-12 credits)
Master's students select 6 credits from the following in consultation with the Materials Science and Engineering director of graduate studies. Doctoral students take all 12 credits.
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Materials Science and Engineering Ph.D.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: https://cse.umn.edu/cems

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials and characterization methods, and the application of sophisticated mathematical and theoretical models. Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, transport, advanced mathematics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, colloids, principles of mass transfer in engineering and biological engineering, rheology, process control, ceramics, polymers, scattering, and electrochemical engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

Other requirements to be completed before admission:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement summarizing research/work experience and motivation for graduate work.

Special Application Requirements:
Applications are accepted for fall semester only. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for fellowships and assistantships; late applications are considered if space is available.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Use of 4xxx courses requires director of graduate studies approval.

Students must attend the departmental seminar for six semesters. Registration is not required; informal attendance will be done within the department.

Core Courses (12 credits)
Select 12 credits from the following in consultation with the advisor:
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
MATS 8201 - Applied Math (3.0 cr)
MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)

Electives (9 credits)
Select elective credits from the following, in consultation with the advisor, to meet the 21 course credits required for the major field.
Other courses can be selected with advisor and director of graduate studies approval.
MATS 4214 - Polymers (3.0 cr)
MATS 5517 - Microscopy of Materials (3.0 cr)
MATS 5531 - Electrochemical Engineering (3.0 cr)
MATS 5771 - Colloids and Dispersions (3.0 cr)
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
MATS 8103 - Scattering from Soft Matter (2.0 cr)
MATS 8201 - Applied Math (3.0 cr)
MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
MATS 8217 - Transmission Electron Microscopy (3.0 cr)
MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
MATS 8301 - Physical Rate Processes I: Transport (3.0 cr)
MATS 8995 - Special Topics (1.0 - 4.0 cr)

Outside Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor. Other courses may be applied to this requirement with advisor and director of graduate studies approval.
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8203 - Fluid Mechanics III (3.0 cr)
AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
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<th>Course Title</th>
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<td>AEM 8511</td>
<td>Advanced Topics in Continuum Mechanics (3.0 cr)</td>
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<tr>
<td>AEM 8525</td>
<td>Elastic Stability of Materials (3.0 cr)</td>
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<td>STAT 5303</td>
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STAT 5601 - Nonparametric Methods (3.0 cr)

**Thesis Credits (24 credits)**
Take 24 doctoral thesis credits after passing the preliminary oral exam.

**MATS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**
Twin Cities Campus
Mathematics M.S.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: https://cse.umn.edu/math

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a master of science (MS) in mathematics. Students may also earn the MS degree with emphasis in applied and industrial mathematics or with emphasis in mathematics education.

Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Undergraduate degree in mathematics or equivalent.

Other requirements to be completed before admission:
Applicants should have the prerequisite material of abstract algebra, analysis, and topology.

GRE scores are not required for admission.

To receive full consideration for financial support, applicants for whom English is not their native language should have an English Language Proficiency Score of at least a 2 per University of Minnesota policy, which is a total score of 100 or higher and a speaking score of 23 or higher on the TOEFL iBT or a total score of 7 or higher with a speaking score of 7 or higher on the IELTS.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is February 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 18
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6
  - Speaking Score: 6
Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 15 to 30 major credits and 0 to 15 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each course.

Students choose a program of coursework in consultation with their advisor and the director of graduate studies.

Outside Coursework (6 to 15 credits)

Plan A students select at least 6 credits, and Plan B students select up to 15 credits in consultation with the advisor and director of graduate studies. Courses may include mathematics coursework outside the major research area.

Plan Options

Plan A

Major Field Coursework (14 credits)
Select at least 14 credits in consultation with advisor and director of graduate studies.

Thesis Credits
Take 10 master's thesis credits.
MATH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

OR

Plan B

Major Field Coursework (15 credits)
Select at least 15 credits in consultation with advisor and director of graduate studies from the following:

MATH 8141 - Applied Logic (3.0 cr)
MATH 8142 - Applied Logic (3.0 cr)
MATH 8151 - Axiomatic Set Theory (3.0 cr)
MATH 8152 - Axiomatic Set Theory (3.0 cr)
MATH 8166 - Recursion Theory (3.0 cr)
MATH 8167 - Recursion Theory (3.0 cr)
MATH 8201 - General Algebra (3.0 cr)
MATH 8202 - General Algebra (3.0 cr)
MATH 8207 - Theory of Modular Forms and L-Functions (3.0 cr)
MATH 8208 - Theory of Modular Forms and L-Functions (3.0 cr)
MATH 8211 - Commutative and Homological Algebra (3.0 cr)
MATH 8212 - Commutative and Homological Algebra (3.0 cr)
MATH 8245 - Group Theory (3.0 cr)
MATH 8246 - Group Theory (3.0 cr)
MATH 8251 - Algebraic Number Theory (3.0 cr)
MATH 8252 - Algebraic Number Theory (3.0 cr)
MATH 8253 - Algebraic Geometry (3.0 cr)
MATH 8254 - Algebraic Geometry (3.0 cr)
MATH 8270 - Topics in Algebraic Geometry (1.0 - 3.0 cr)
MATH 8271 - Lie Groups and Lie Algebras (3.0 cr)
MATH 8272 - Lie Groups and Lie Algebras (3.0 cr)
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</tbody>
</table>
Twin Cities Campus
Mathematics Minor
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391, fax: 612-624-6702)
Email: mathgrad@umn.edu
Website: https://cse.umn.edu/math

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Special areas of research include ordinary and partial differential equations; probability: real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Mathematics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Consult the Mathematics director of graduate studies in advance for course approval.

Minor Coursework (6 to 12 credits)
Master’s students select at least 6 credits from two semester courses and doctoral students select at least 12 credits from four semester courses to meet coursework requirements. Courses are selected in consultation with the advisor and the Mathematics director of graduate study.

- MATH 8141 - Applied Logic (3.0 cr)
- MATH 8142 - Applied Logic (3.0 cr)
- MATH 8151 - Axiomatic Set Theory (3.0 cr)
- MATH 8152 - Axiomatic Set Theory (3.0 cr)
- MATH 8166 - Recursion Theory (3.0 cr)
- MATH 8167 - Recursion Theory (3.0 cr)
- MATH 8172 - Model Theory (3.0 cr)
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>MATH 8173</td>
<td>Model Theory</td>
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<tr>
<td>MATH 8190</td>
<td>Topics in Logic</td>
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<td>MATH 8201</td>
<td>General Algebra</td>
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<td>MATH 8207</td>
<td>Theory of Modular Forms and L-Functions</td>
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<td>Theory of Modular Forms and L-Functions</td>
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<td>Commutative and Homological Algebra</td>
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<td>MATH 8245</td>
<td>Group Theory</td>
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<td>Lie Groups and Lie Algebras</td>
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<td>Riemannian Geometry</td>
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<td>MATH 8370</td>
<td>Topics in Differential Geometry</td>
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<td>Topics in Advanced Geometry</td>
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<td>MATH 8385</td>
<td>Calculus of Variations and Minimal Surfaces</td>
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<td>Mathematical Modeling of Industrial Problems</td>
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<td>Topics in Mathematical Physics</td>
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<td>MATH 8651</td>
<td>Theory of Probability Including Measure Theory</td>
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<tr>
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MATH 8654 - Fundamentals of Probability Theory and Stochastic Processes (3.0 cr)
MATH 8655 - Stochastic Calculus with Applications (3.0 cr)
MATH 8659 - Stochastic Processes (3.0 cr)
MATH 8660 - Topics in Probability (1.0 - 3.0 cr)
MATH 8668 - Combinatorial Theory (3.0 cr)
MATH 8669 - Combinatorial Theory (3.0 cr)
MATH 8680 - Topics in Combinatorics (1.0 - 3.0 cr)
MATH 8701 - Complex Analysis (3.0 cr)
MATH 8702 - Complex Analysis (3.0 cr)
MATH 8790 - Topics in Complex Analysis (1.0 - 3.0 cr)
MATH 8801 - Functional Analysis (3.0 cr)
MATH 8802 - Functional Analysis (3.0 cr)
MATH 8990 - Topics in Mathematics (1.0 - 6.0 cr)
MATH 8991 - Independent Study (1.0 - 6.0 cr)
MATH 8992 - Directed Reading (1.0 - 6.0 cr)
MATH 8993 - Directed Study (1.0 - 6.0 cr)
MATH 8994 - Topics at the IMA (1.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Mathematics Ph.D.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: https://cse.umn.edu/math

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a PhD in mathematics and a PhD in mathematics with emphasis in applied mathematics.

Special areas of research include ordinary and partial differential equations; probability: real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Undergraduate degree in mathematics or equivalent.

Other requirements to be completed before admission:
Applicants should have the prerequisite material of abstract algebra, analysis, and topology.

GRE scores are not required for admission.

To receive full consideration for financial support, applicants for whom English is not their native language should have an English Language Proficiency (ELP) score of at least a 2, which is a total score of 100 or higher and a speaking score of 23 or higher on the TOEFL iBT or a total score of 7 or higher with a speaking score of 7 or higher on the IELTS.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is December 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 18
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6
  - Speaking Score: 6

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B earned for each course.

Students choose a program of coursework in consultation with their advisor and the director of graduate studies that best prepares them for research in mathematics.

Major Coursework (24 credits)
A minimum of 24 major credits is required. Courses are selected with the advisor and director of graduate studies.

MATH 8141 - Applied Logic (3.0 cr)
MATH 8142 - Applied Logic (3.0 cr)
MATH 8151 - Axiomatic Set Theory (3.0 cr)
MATH 8152 - Axiomatic Set Theory (3.0 cr)
MATH 8166 - Recursion Theory (3.0 cr)
MATH 8167 - Recursion Theory (3.0 cr)
MATH 8172 - Model Theory (3.0 cr)
MATH 8173 - Model Theory (3.0 cr)
MATH 8190 - Topics in Logic (1.0 - 3.0 cr)
MATH 8201 - General Algebra (3.0 cr)
MATH 8202 - General Algebra (3.0 cr)
MATH 8207 - Theory of Modular Forms and L-Functions (3.0 cr)
MATH 8208 - Theory of Modular Forms and L-Functions (3.0 cr)
MATH 8211 - Commutative and Homological Algebra (3.0 cr)
MATH 8212 - Commutative and Homological Algebra (3.0 cr)
MATH 8245 - Group Theory (3.0 cr)
MATH 8246 - Group Theory (3.0 cr)
MATH 8251 - Algebraic Number Theory (3.0 cr)
MATH 8252 - Algebraic Number Theory (3.0 cr)
MATH 8253 - Algebraic Geometry (3.0 cr)
MATH 8254 - Algebraic Geometry (3.0 cr)
MATH 8270 - Topics in Algebraic Geometry (1.0 - 3.0 cr)
MATH 8271 - Lie Groups and Lie Algebras (3.0 cr)
MATH 8272 - Lie Groups and Lie Algebras (3.0 cr)
MATH 8280 - Topics in Number Theory (1.0 - 3.0 cr)
MATH 8300 - Topics in Algebra (1.0 - 3.0 cr)
MATH 8301 - Manifolds and Topology (3.0 cr)
MATH 8302 - Manifolds and Topology (3.0 cr)
MATH 8306 - Algebraic Topology (3.0 cr)
MATH 8307 - Algebraic Topology (3.0 cr)
MATH 8360 - Topics in Topology (1.0 - 3.0 cr)
MATH 8365 - Riemannian Geometry (3.0 cr)
MATH 8366 - Riemannian Geometry (3.0 cr)
MATH 8370 - Topics in Differential Geometry (1.0 - 3.0 cr)
MATH 8380 - Topics in Advanced Geometry (1.0 - 3.0 cr)
MATH 8385 - Calculus of Variations and Minimal Surfaces (3.0 cr)
MATH 8386 - Calculus of Variations and Minimal Surfaces (3.0 cr)
MATH 8387 - Mathematical Modeling of Industrial Problems (3.0 cr)
MATH 8388 - Mathematical Modeling of Industrial Problems (3.0 cr)
MATH 8390 - Topics in Mathematical Physics (1.0 - 3.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8431 - Mathematical Fluid Mechanics (3.0 cr)
MATH 8432 - Mathematical Fluid Mechanics (3.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8446 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8450 - Topics in Numerical Analysis (1.0 - 3.0 cr)
MATH 8470 - Topics in Mathematical Theory of Continuum Mechanics (1.0 - 3.0 cr)
MATH 8501 - Differential Equations and Dynamical Systems I (3.0 cr)
MATH 8502 - Differential Equations and Dynamical Systems II (3.0 cr)
MATH 8503 - Bifurcation Theory in Ordinary Differential Equations (3.0 cr)
MATH 8505 - Applied Dynamical Systems and Bifurcation Theory I (3.0 cr)
MATH 8506 - Applied Dynamical Systems and Bifurcation Theory II (3.0 cr)
MATH 8520 - Topics in Dynamical Systems (1.0 - 3.0 cr)
MATH 8530 - Topics in Ordinary Differential Equations (1.0 - 3.0 cr)
MATH 8540 - Topics in Mathematical Biology (1.0 - 3.0 cr)
MATH 8571 - Theory of Evolutionary Equations (3.0 cr)
MATH 8572 - Theory of Evolutionary Equations (3.0 cr)
MATH 8580 - Topics in Evolutionary Equations (1.0 - 3.0 cr)
MATH 8581 - Applications of Linear Operator Theory (3.0 cr)
MATH 8582 - Applications of Linear Operator Theory (3.0 cr)
MATH 8583 - Theory of Partial Differential Equations (3.0 cr)
MATH 8584 - Theory of Partial Differential Equations (3.0 cr)
MATH 8590 - Topics in Partial Differential Equations (1.0 - 3.0 cr)
MATH 8600 - Topics in Advanced Applied Mathematics (1.0 - 3.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 8640 - Topics in Real Analysis (3.0 cr)
MATH 8641 - Spatial Ecology (3.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8654 - Fundamentals of Probability Theory and Stochastic Processes (3.0 cr)
MATH 8655 - Stochastic Calculus with Applications (3.0 cr)
MATH 8659 - Stochastic Processes (3.0 cr)
MATH 8660 - Topics in Probability (1.0 - 3.0 cr)
MATH 8668 - Combinatorial Theory (3.0 cr)
MATH 8669 - Combinatorial Theory (3.0 cr)
MATH 8680 - Topics in Combinatorics (1.0 - 3.0 cr)
MATH 8701 - Complex Analysis (3.0 cr)
MATH 8702 - Complex Analysis (3.0 cr)
MATH 8790 - Topics in Complex Analysis (1.0 - 3.0 cr)
MATH 8801 - Functional Analysis (3.0 cr)
MATH 8802 - Functional Analysis (3.0 cr)
MATH 8990 - Topics in Mathematics (1.0 - 6.0 cr)
MATH 8991 - Independent Study (1.0 - 6.0 cr)
MATH 8992 - Directed Reading (1.0 - 6.0 cr)
MATH 8993 - Directed Study (1.0 - 6.0 cr)
MATH 8994 - Topics at the IMA (1.0 - 3.0 cr)

Outside Coursework (12 credits)
A minimum of 12 credits in a minor or supporting program that supports the thesis research are required. If a supporting program is chosen, it may consist partly or entirely of mathematics courses outside the student's major research area. Coursework is selected with the advisor and director of graduate studies.

Thesis Credits (24 credits)
Take 24 doctoral thesis credits after passing preliminary oral exam.
MATH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Mechanical Engineering M.S.M.E.

Mechanical Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gardn032@umn.edu, vandeven@umn.edu
Website: https://cse.umn.edu/me

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Mechanical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research are offered in advanced and additive manufacturing; bioengineering; combustion; computer-aided design; computer-aided manufacturing; control systems; energy conservation; environmental control; environmental engineering; fluid mechanics; fluid power; heat and mass transfer; machine design; manufacturing engineering; nanoengineering and nanotechnology; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; solar energy; sprays and multiphase flows; systems dynamics; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; vibration; wind energy; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year BS degree in engineering, science, or mathematics.

Special Application Requirements:
The department offers two options for applying to the masters degree program. The standard application requires a full set of application materials and allows admission to the Plan A or Plan C degree options. The streamlined application offers an abbreviated application process and admission is only for the coursework-only masters degree (Plan C). The program does not accept applications directly to the MSME Plan B option; rather, the Plan B is an additional or alternative credential for students admitted to the Mechanical Engineering PhD program.

Students admitted to the Plan C option are not eligible for financial support from the department.

Applications are accepted for fall semester only. The standard application deadline is December 15 and the streamlined application deadline is April 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral.

**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

No more than 6 4xxx-level course credits can be applied to degree requirements.

**Major Coursework Requirements**

**Required Seminar (1 credit)**
Select 1 seminar credit from the following in consultation with the advisor. Other seminars may be chosen with advisor and director of graduate studies approval.

- ME 8773 - Graduate Seminar (1.0 cr)
- ME 8774 - Graduate Seminar (1.0 cr)

**Math Course**
Select one course from following in consultation with the advisor:

- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
- MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
- MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
- MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
- PHYS 5041 - Mathematical Methods for Physics (4.0 cr)

**Core Courses**
Plan A students select two courses, and Plan B and Plan C students select four courses, from any of the following topic areas in consultation with the advisor:

**Controls and System Dynamics:**

- ME 5281 - Feedback Control Systems (4.0 cr)
- ME 8281 - Advanced Control System Design-1 (3.0 cr)
- ME 8282 - Advanced Control Systems Design-2 (3.0 cr)

**Design and Manufacturing:**

- ME 5223 - Materials in Design (4.0 cr)
- ME 5243 - Advanced Mechanism Design (4.0 cr)
- ME 5247 - Applied Stress Analysis (4.0 cr)

**Fluid Mechanics:**

- ME 5332 - Intermediate Fluid Mechanics (4.0 cr)
- ME 8332 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)

**Reacting Systems:**

- ME 8111 - Multiphase Systems Analysis (3.0 cr)
- ME 8361 - Molecular Gas Dynamics (3.0 cr)
- ME 8363 - Introduction to Reactive Flow Systems (3.0 cr)

**Thermodynamics and Heat Transfer:**

- ME 8341 - Conduction (3.0 cr)
- ME 8342 - Convection (3.0 cr)
- ME 8343 - Radiation (3.0 cr)

**Electives**
Plan A students select credits as needed to meet the 20 course credits required; Plan B and Plan C students select credits as needed to complete the 30-credit requirement. Other courses can be selected with advisor and director of graduate studies approval.
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 4581 - Mechanics of Solids (3.0 cr)
AEM 5253 - Computational Fluid Mechanics (3.0 cr)
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8207 - Hydrodynamic Stability (3.0 cr)
AEM 8211 - Theory of Turbulence I (3.0 cr)
AEM 8212 - Theory of Turbulence II (3.0 cr)
AEM 8232 - Physical Gas Dynamics and Molecular Simulation (3.0 cr)
AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
AEM 8442 - Aerospace Positioning, Navigation and Timing (3.0 cr)
AEM 8451 - System Identification: Theory and Applications (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
CHEN 5402 - Introduction to Quantum Mechanics and Spectroscopy (3.0 cr)
CHEM 6021 - Computational Chemistry (4.0 cr)
CHEM 7711 - Colloids and Dispersions (3.0 cr)
CHEN 8102 - Introduction to Rheology (2.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
EE 4541 - Digital Signal Processing (3.0 cr)
EE 5171 - Microelectronic Fabrication (3.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 8216 - Nonlinear Systems (3.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
ME 5103 - Thermal Environmental Engineering (4.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
ME 5221 - Computer-Assisted Product Realization (4.0 cr)
ME 5223 - Materials in Design (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5229 - Finite Element Method for Computational Mechanics: Transient/Dynamic Applications (4.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5248 - Vibration Engineering (4.0 cr)
ME 5281 - Feedback Control Systems (4.0 cr)
ME 5286 - Robotics (4.0 cr)
ME 5312 - Solar Thermal Technologies (4.0 cr)
ME 5332 - Intermediate Fluid Mechanics (4.0 cr)
ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
ME 5344 - Thermodynamics of Fluid Flow with Applications (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 5461 - Internal Combustion Engines (4.0 cr)
ME 5462 - Gas Turbines (4.0 cr)
ME 5666 - Modern Thermodynamics (4.0 cr)
ME 8111 - Multiphase Systems Analysis (3.0 cr)
ME 8113 - Advanced Aerosol/Particle Engineering (3.0 cr)
ME 8221 - New Product Design and Business Development I (4.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8229 - Finite Element Methods for Computational Mechanics: Transient/Dynamic Problems (4.0 cr)
ME 8243 - Topics in Design: Advanced Fluid Power (4.0 cr)
ME 8253 - Computational Nanomechanics (3.0 cr)
ME 8254 - Fundamentals of Microelectromechanical Systems (MEMS) (4.0 cr)
ME 8255 - Introduction to Nanotechnology (3.0 cr)
ME 8257 - Advanced Control System Design-1 (3.0 cr)
ME 8258 - Advanced Control Systems Design-2 (3.0 cr)
ME 8283 - Design of Mechatronic Products (4.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8287 - Topics in Dynamics and Control (2.0 - 4.0 cr)
ME 8302 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)
ME 8303 - Experimental Methods in the Thermal Sciences (3.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8342 - Convection (3.0 cr)
ME 8343 - Radiation (3.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
ME 8350 - Heat Transfer Physics (3.0 cr)
ME 8361 - Molecular Gas Dynamics (3.0 cr)
ME 8362 - Introduction to Plasma Technology (3.0 cr)
ME 8363 - Introduction to Reactive Flow Systems (3.0 cr)
ME 8381 - Bioheat and Mass Transfer (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences: Biostabilization in Biomedicine, and Biotechnology (1.0 - 3.0 cr)
ME 8446 - Advanced Combustion (3.0 cr)
ME 8794 - Mechanical Engineering Research (1.0 - 4.0 cr)
PHYS 4101 - Quantum Mechanics (4.0 cr)
PHYS 4201 - Statistical and Thermal Physics (3.0 cr)
PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)

Plan Options

Plan A
Thesis Credits
- Take 10 master's thesis credits.
  ME 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Integrated B.M.E./M.S.M.E.
The Department of Mechanical Engineering offers an integrated bachelor's/master's degree program. The program makes it possible for students to earn a bachelor's degree (BME) and a master's degree (MSME) in Mechanical Engineering in five years. The program has several benefits: a streamlined admissions process from the undergraduate program to the graduate program; graduate student status granted in the senior year; eligibility for research assistantships; and flexibility in fulfilling required courses for both degrees simultaneously in the last two years of study.

Eligible applicants must be University undergraduates within 32 semester credits of completing the BME degree, with a minimum 3.25 GPA preferred.

Both the BME and MSME degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MSME degree are permitted to count credits originally planned for the graduate program toward their undergraduate technical electives.
Twin Cities Campus
Mechanical Engineering Minor
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gardn032@umn.edu, vandeven@umn.edu
Website: https://cse.umn.edu/me

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework is offered in advanced and additive manufacturing; bioengineering; combustion; computer-aided design; computer-aided manufacturing; control systems; energy conservation; environmental control; environmental engineering; fluid mechanics; fluid power; heat and mass transfer; machine design; manufacturing engineering; nanoengineering and nanotechnology; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; solar energy; sprays and multiphase flows; systems dynamics; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; vibration; wind energy; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Mechanical Engineering director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N.

The minimum cumulative GPA for the minor is 3.00.

Minor Courses (6-12 credits)
Master's students select 6 credits, and doctoral students select 12 credits from the following in consultation with the Mechanical Engineering director of graduate studies:
ME 5103 - Thermal Environmental Engineering (4.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
ME 5221 - Computer-Assisted Product Realization (4.0 cr)
ME 5223 - Materials in Design (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5229 - Finite Element Method for Computational Mechanics: Transient/Dynamic Applications (4.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 5247 - Applied Stress Analysis (4.0 cr)
ME 5248 - Vibration Engineering (4.0 cr)
ME 5281 - Feedback Control Systems (4.0 cr)
ME 5286 - Robotics (4.0 cr)
ME 5312 - Solar Thermal Technologies (4.0 cr)
ME 5332 - Intermediate Fluid Mechanics (4.0 cr)
ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
ME 5344 - Thermodynamics of Fluid Flow With Applications (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 5461 - Internal Combustion Engines (4.0 cr)
ME 5462 - Gas Turbines (4.0 cr)
ME 5666 - Modern Thermodynamics (4.0 cr)
ME 8111 - Multiphase Systems Analysis (3.0 cr)
ME 8113 - Advanced Aerosol/Particle Engineering (3.0 cr)
ME 8221 - New Product Design and Business Development I (4.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8229 - Finite Element Methods for Computational Mechanics:Transient/Dynamic Problems (4.0 cr)
ME 8243 - Topics in Design: Advanced Fluid Power (4.0 cr)
ME 8253 - Computational Nanomechanics (3.0 cr)
ME 8254 - Fundamentals of Microelectromechanical Systems (MEMS) (4.0 cr)
ME 8255 - Introduction to Nanotechnology (3.0 cr)
ME 8281 - Advanced Control System Design-1 (3.0 cr)
ME 8282 - Advanced Control Systems Design-2 (3.0 cr)
ME 8283 - Design of Mechatronic Products (4.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ME 8287 - Topics in Dynamics and Control (2.0 - 4.0 cr)
ME 8332 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)
ME 8337 - Experimental Methods in the Thermal Sciences (3.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8342 - Convection (3.0 cr)
ME 8343 - Radiation (3.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
ME 8350 - Heat Transfer Physics (3.0 cr)
ME 8361 - Molecular Gas Dynamics (3.0 cr)
ME 8362 - Introduction to Plasma Technology (3.0 cr)
ME 8363 - Introduction to Reactive Flow Systems (3.0 cr)
ME 8381 - Bioheat and Mass Transfer (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences : Biostabilization in Biomedicine, and Biotechnology (1.0 - 3.0 cr)
ME 8446 - Advanced Combustion (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Mechanical Engineering Ph.D.
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E.,
Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gardn032@umn.edu, vandeven@umn.edu
Website: https://cse.umn.edu/me

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research are offered in advanced and additive manufacturing; bioengineering; combustion; computer-aided design; computer-aided manufacturing; control systems; energy conservation; environmental control; environmental engineering; fluid mechanics; fluid power; heat and mass transfer; machine design; manufacturing engineering; nanoengineering and nanotechnology; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; solar energy; sprays and multiphase flows; systems dynamics; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; vibration; wind energy; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year BS degree in engineering, science, or mathematics.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is December 15.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

A minimum of 12 course credits at the 8000-level are required (seminars and ethics courses may not be included).

Use of 4xxx courses requires approval of the advisor and director of graduate studies.

**Major Coursework Requirements**

**Required Seminar (2 credits)**
Select 2 seminar credits from the following in consultation with the advisor. Other seminars may be chosen with advisor and director of graduate studies approval.

- ME 8773 - Graduate Seminar (1.0 cr)
- ME 8774 - Graduate Seminar (1.0 cr)

**Math Course**
Select one course from following in consultation with the advisor:

- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
- MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
- MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
- MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
- PHYS 5041 - Mathematical Methods for Physics (4.0 cr)

**Core Courses**
Select four courses from the following in consultation with the advisor. Two courses must be from the same topic area.

- **Controls and System Dynamics:**
  - ME 5281 - Feedback Control Systems (4.0 cr)
  - ME 8281 - Advanced Control System Design-1 (3.0 cr)
  - ME 8282 - Advanced Control Systems Design-2 (3.0 cr)

- **Design and Manufacturing:**
  - ME 5223 - Materials in Design (4.0 cr)
  - ME 5243 - Advanced Mechanism Design (4.0 cr)
  - ME 5247 - Applied Stress Analysis (4.0 cr)

- **Fluid Mechanics:**
  - ME 5332 - Intermediate Fluid Mechanics (4.0 cr)
  - ME 8332 - Advanced Fluid Dynamics in Mechanical Engineering (3.0 cr)

- **Reacting Systems:**
  - ME 8111 - Multiphase Systems Analysis (3.0 cr)
  - ME 8361 - Molecular Gas Dynamics (3.0 cr)
  - ME 8363 - Introduction to Reactive Flow Systems (3.0 cr)

- **Thermodynamics and Heat Transfer:**
  - ME 8341 - Conduction (3.0 cr)
  - ME 8342 - Convection (3.0 cr)
  - ME 8343 - Radiation (3.0 cr)

**Electives**
Select credits as needed to complete the 36 course credits required. Other courses can be selected with advisor and director of graduate studies approval.

- AEM 4511 - Mechanics of Composite Materials (3.0 cr)
- AEM 4581 - Mechanics of Solids (3.0 cr)
- AEM 5253 - Computational Fluid Mechanics (3.0 cr)
- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 8201 - Fluid Mechanics I (3.0 cr)
- AEM 8202 - Fluid Mechanics II (3.0 cr)
- AEM 8207 - Hydrodynamic Stability (3.0 cr)
- AEM 8211 - Theory of Turbulence I (3.0 cr)
- AEM 8212 - Theory of Turbulence II (3.0 cr)
- AEM 8232 - Physical Gas Dynamics and Molecular Simulation (3.0 cr)
- AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)
ME 8337 - Experimental Methods in the Thermal Sciences (3.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8342 - Convection (3.0 cr)
ME 8343 - Radiation (3.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
ME 8350 - Heat Transfer Physics (3.0 cr)
ME 8361 - Molecular Gas Dynamics (3.0 cr)
ME 8362 - Introduction to Plasma Technology (3.0 cr)
ME 8363 - Introduction to Reactive Flow Systems (3.0 cr)
ME 8381 - Bioheat and Mass Transfer (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences : Biostabilization in Biomedicine, and Biotechnology (1.0 - 3.0 cr)
ME 8446 - Advanced Combustion (3.0 cr)
ME 8794 - Mechanical Engineering Research (1.0 - 4.0 cr)
PHYS 4101 - Quantum Mechanics (4.0 cr)
PHYS 4201 - Statistical and Thermal Physics (3.0 cr)
PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)

**Thesis Credits (24 credits)**
Take 24 doctoral thesis credits after passing preliminary oral exam.
ME 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Medical Device Innovation M.S.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, College of Science and Engineering, University of Minnesota, Suite 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
Phone: 612-624-5747
Fax: 612-624-7510
Email: mdi@umn.edu
Website: https://cse.umn.edu/tli

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Medical Device Innovation master of science (MS) degree is an interdisciplinary program comprising courses in the core areas of technology innovation management and medical industry dynamics. Students experiences are enhanced through therapeutic-area-based group activities and hands-on experiences in innovative biodesign through practicums at the Medical Devices Center. The 22-month program draws upon the fields of technology innovation, product development, project and business management, intellectual property, regulatory affairs, clinical needs, entrepreneurship, emerging trends, globalization, reimbursement, and public policy. This program provides students with a full understanding of medical device innovation from start to finish. In doing so, it goes well beyond the traditional technology focus of most master's programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a related field, such as biological or physical sciences, engineering, computer science, mathematics, statistics, or business is preferred.

Other requirements to be completed before admission:
A strong background in science, engineering, and math, with at least two to five years of work experience, is preferred.

Special Application Requirements:
Applications are accepted on a rolling basis for the program's start in fall of each year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The capstone project is independent, original, and applied research on a relevant subject, problem, or issue in areas of medical device technologies, policy, business, or innovation. The capstone project is rooted in real-world topics in the industry, and is usually framed in cooperation with the students organization or employer.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

Application of 4xxx courses toward program requirements requires approval of the advisor and the director of graduate studies.

Core Courses (26 credits)

Take the following courses:

- MDI 5004 - Clinical Foundations of Medical Device Innovation (3.0 cr)
- MDI 5006 - Finance, Valuation, and Entrepreneurship (3.0 cr)
- MDI 5008 - Quality, Regulatory and Operations Management (3.0 cr)
- MDI 5010 - Product Innovation & Development Management (2.0 cr)
- MDI 5013 - Biodesign Practicum I (2.0 cr)
- MDI 5014 - Biodesign Practicum II (2.0 cr)
- MDI 5015 - Biodesign Practicum III (2.0 cr)
- MOT 8114 - Strategic Technology Analysis (1.5 cr)
- MOT 8133 - Managerial Communication for Technological Leaders: Persuasive Writing and Speaking (2.0 cr)
- MOT 8214 - Technology Foresight and Forecasting (2.0 cr)
- MOT 8224 - Pivotal Technologies (1.0 cr)
- MOT 8501 - Leading Individual & Team Performance (1.5 cr)
- MOT 8502 - Innovation Leadership and Organizational Effectiveness (1.0 cr)

Electives (6 credits)

Take 6 credits from the following in consultation with the advisor. Students selecting topics courses MGMT 6100 or ME 8262 must get approval of the topic prior to registering from the director of graduate studies.

- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microsystems (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
- BMEN 5411 - Neural Engineering (3.0 cr)
- BMEN 5412 - Neuromodulation (3.0 cr)
- BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
- BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
- BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
- BTHX 5300 - Foundations of Bioethics (3.0 cr)

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Information current as of November 07, 2022
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<tr>
<th>Course Code</th>
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<td>BTHX 5610</td>
<td>Research &amp; Publication Seminar (1.0 cr)</td>
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<td>Ethical and legal issues in Genetic Counseling (2.0 cr)</td>
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<td>Gender and the Politics of Health (3.0 cr)</td>
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<td>User Interface Design, Implementation and Evaluation (3.0 cr)</td>
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<td>Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)</td>
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<td>CSCI 5461</td>
<td>Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)</td>
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<td>Micro and Nanotechnology by Self Assembly (3.0 cr)</td>
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<td>Optimal Filtering and Estimation (3.0 cr)</td>
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<td>ENTR 6025</td>
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<td>Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)</td>
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<td>Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)</td>
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<td>Management of Innovation and Change</td>
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<td>MGMT 6084</td>
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<td>MILI 6235</td>
<td>Pharmaceutical Industry: Business and Policy</td>
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<td>Healthcare Law: Strategic and Business Implications</td>
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<td>Medical Technology Evaluation and Market Research</td>
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<td>Medical Device Industry: Business and Public Policy</td>
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<td>MILI 6963</td>
<td>Healthcare Analytics</td>
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<td>The Health Care Marketplace</td>
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<td>Anatomy and Physiology for Managers</td>
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<td>MILI 6992</td>
<td>Healthcare Delivery Innovations: Optimizing Cost and Quality</td>
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<td>MILI 6995</td>
<td>Medical Industry Valuation Laboratory</td>
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<td>MKTG 6088</td>
<td>Strategic Marketing</td>
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<td>NEUR 5230</td>
<td>Cerebrovascular Hemodynamics and Diseases I</td>
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<td>PDES 5701</td>
<td>User-Centered Design Studio</td>
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<td>PDES 5704</td>
<td>Computer-Aided Design Methods</td>
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<td>PHSL 5061</td>
<td>Principles of Physiology for Biomedical Engineering</td>
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<td>PHSL 5510</td>
<td>Advanced Cardiac Physiology and Anatomy</td>
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<td>PHSL 5525</td>
<td>Anatomy and Physiology of the Pelvis and Urinary System</td>
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<td>PSY 5065</td>
<td>Functional Imaging: Hands-on Training</td>
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<td>PUBH 6751</td>
<td>Principles of Management in Health Services Organizations</td>
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<td>PUBH 6862</td>
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<td>RSC 5101</td>
<td>Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences</td>
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<td>Introduction to Rehabilitation Science</td>
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<td>RSC 5135</td>
<td>Advanced Biomechanics I: Kinematics</td>
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<td>RSC 5200</td>
<td>Introduction to Neuromodulation</td>
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<td>RSC 5231</td>
<td>Clinical Biomechanics</td>
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<td>RSC 5281</td>
<td>Physiology for Physical Rehabilitation</td>
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<td>SCB 8181</td>
<td>Stem Cell Biology</td>
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<td>ST 8109</td>
<td>Cybersecurity Foundations - Technology, Risk &amp; Communication</td>
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<td>ST 8110</td>
<td>Security Science and Technology Foundations</td>
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<td>ST 8111</td>
<td>Methods, Theory, and Applications</td>
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<td>ST 8113</td>
<td>Information and Cyber Security</td>
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<td>ST 8220</td>
<td>Vulnerability, Risk and Threat Assessment and Management</td>
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<td>ST 8330</td>
<td>Critical Infrastructure Protection</td>
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<td>ST 8331</td>
<td>Dynamic Systems Modeling and Simulation Tools</td>
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<td>ST 8513</td>
<td>Cyber Threat Intelligence</td>
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<td>ST 8661</td>
<td>Securing Cyberspace (Fundamentals)</td>
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<tr>
<td>ST 8662</td>
<td>Securing Cyberspace - Advanced</td>
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**Capstone Project (2 credits)**

Take 2 credits of the following in consultation with the advisor:

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<td>MDI 5020</td>
<td>Medical Device Innovation Capstone</td>
<td>1.0 - 2.0 cr</td>
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</table>
Twin Cities Campus

Neuroengineering Minor
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Graduate Minor in Neuroengineering, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax 612-626-6583)
Email: bmenpg@umn.edu
Website: http://cne.umn.edu/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The doctoral minor in neuroengineering (NE) is motivated by the notion that future breakthroughs in this rapidly growing area of research will be made by engineers who understand the fundamental issues and principles of neuroscience that occur during neural interventions, and by neuroscientists who are truly competent in engineering concepts and tools. The minor trains students to develop the skills to revolutionize technologies for interfacing with the brain and to advance our understanding of the neuroscience processes that arise when we interface with and modulate the brain.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Neuroengineering director of graduate studies regarding feasibility and requirements including, for students pursuing PhDs in majors other than neuroscience, or in biomedical, electrical, or mechanical engineering, consultation with the Neuroengineering director of graduate studies about the necessary background to succeed in the minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework must be approved by the neuroengineering director of graduate studies.

For any course listed in multiple categories, students must choose which requirement that course will fulfill. A single course cannot be counted simultaneously toward multiple categories.

Coursework applied to minor field requirements offered on both the A-F and S/N grading basis must be graded A-F, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Neuroengineering Seminar (2 credits)
Take the following course:
BMEN 8411 - Neuroengineering Seminar (2.0 cr)

Neuroengineering Course (3 credits)
Select 1 of the following in consultation with the Neuroengineering director of graduate studies. BMEN 5411 is strongly recommended for students who have not already completed a neural engineering course.

**BMEN 5411 - Neural Engineering (3.0 cr)**
**BMEN 5412 - Neuromodulation (3.0 cr)**

**Neuroscience Course (3 credits)**
Select 1 of the following courses in consultation with the Neuroengineering director of graduate studies:

**NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)**
**NSC 5561 - Systems Neuroscience (4.0 cr)**

**Electives**
Select electives as needed, in consultation with the Neuroengineering director of graduate studies, to complete the 12-credit minimum. Other courses may be selected with approval of the Neuroengineering director of graduate studies.

**BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)**
**BMEN 5411 - Neural Engineering (3.0 cr)**
**BMEN 5412 - Neuromodulation (3.0 cr)**
**BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)**
**BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)**
**BMEN 8151 - Biomedical Electronics and Implantable Microsystems (3.0 cr)**
**BMEN 8411 - Neuroengineering Seminar (2.0 cr)**
**BMEN 8502 - Physiological Control Systems (3.0 cr)**
**EE 5231 - Linear Systems and Optimal Control (3.0 cr)**
**EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)**
**EE 5542 - Adaptive Digital Signal Processing (3.0 cr)**
**ME 5281 - Feedback Control Systems (4.0 cr)**
**ME 5286 - Robotics (4.0 cr)**
**MPHY 5176 - Physical Principles of Magnetic Resonance Imaging (3.0 cr)**
**MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)**
**NSC 8111 - Quantitative Neuroscience (3.0 cr)**
**NSC 8217 - Systems and Computational Neuroscience (2.0 cr)**
**PSY 5036W - Computational Vision [WI] (3.0 cr)**
**PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)**
**PSY 5063 - Introduction to Functional MRI (3.0 cr)**
**PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)**

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Doctoral**
Twin Cities Campus
Physics M.S.
School of Physics & Astronomy
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: physics@umn.edu
Website: https://cse.umn.edu/physics

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.30.

Other requirements to be completed before admission:
Upper division courses in the core areas of classical mechanics, electricity and magnetism, quantum mechanics, and statistical and thermal physics are encouraged. It is advisable to have taken an upper division course in experimental methods in physics.

Financial support is generally not offered to students admitted to the terminal MS degree.

GRE scores are not required.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is December 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project (Physics 8500, 4 credits) can comprise either a self-contained research problem, or 1 to 3 papers related to completed courses.

Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy degree requirements.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

Plan A & B must graduate with a minimum GPA of 2.80. Plan C students must complete with a 3.00 GPA.

Plan C students must pass the Physics Graduate Written Exam.

Required Courses (8 to 16 credits)
Plan A and Plan B students complete either the quantum mechanics sequence or the classical physics sequence. Plan C students must complete both sequences. The minimum GPA for the required core courses is 3.30 for Plan C students.

Quantum Mechanics Sequence
- PHYS 5001 - Quantum Mechanics I (4.0 cr)
- PHYS 5002 - Quantum Mechanics II (4.0 cr)

Classical Physics Sequence
- PHYS 5011 - Classical Physics I (4.0 cr)
- PHYS 5012 - Classical Physics II (4.0 cr)

Seminar (2 credits)
Take 1 credit in the fall and 1 credit in the Spring.
- PHYS 5980 - Introduction to Research Seminar (1.0 cr)

Elective Courses (9 to 16 credits)
Plan A students select 10 credits, Plan B students 16 credits, and Plan C students select 9 credits from the following, in consultation with the advisor. Additional courses may be approved by the director of graduate studies.

Atomic Physics and Optics
- PHYS 8161 - Atomic and Molecular Structure (3.0 cr)

Biophysics and Medical Physics
- PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
- PHYS 8300 - Seminar: Biological and Medical Physics (1.0 cr)
- PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
- PHYS 8312 - Biological Physics of Macroscopic Systems (3.0 cr)

Condensed Matter Physics
- PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
- PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
- PHYS 5750 - Advanced Topics in Quantum Mechanics and Quantum Information (3.0 cr)
- PHYS 8014 - Quantum many Body Systems (3.0 cr)
- PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)
- PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
- PHYS 8711 - Solid-State Physics I (3.0 cr)
- PHYS 8712 - Solid-State Physics II (3.0 cr)
- PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)

Elementary Particle Physics
- PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
- PHYS 8011 - Quantum Field Theory I (3.0 cr)
- PHYS 8012 - Quantum Field Theory II (3.0 cr)
- PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
- PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)
- PHYS 8901 - Elementary Particle Physics I (3.0 cr)
PHYS 8902 - Elementary Particle Physics II (3.0 cr)
PHYS 8911 - Introduction to Supersymmetry (3.0 cr)

Mathematical, Advanced Quantum, and Computational Physics
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)

Nuclear Physics
PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)
PHYS 8801 - Nuclear Physics I (3.0 cr)
PHYS 8802 - Nuclear Physics II (3.0 cr)
PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)

Plasma and Space Physics
PHYS 4611 - Introduction to Space Physics (3.0 cr)
PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
PHYS 5621 - Introduction to Plasma Physics (3.0 cr)
PHYS 8600 - Seminar: Space Physics (1.0 cr)
PHYS 8601 - Plasma Physics I (3.0 cr)
PHYS 8602 - Plasma Physics II (3.0 cr)
PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)

Relativity and Cosmology
PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)
PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
PHYS 8502 - General Relativity and Cosmology II (3.0 cr)

Physics Education
PHYS 5072 - Best Practices in College Physics Teaching (1.0 - 3.0 cr)
PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)

Plan Options

Plan A (10 credits)
Take 10 master's thesis credits.
PHYS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B (4 credits)
Take the following course:
PHYS 8500 - Plan B Project (4.0 cr)

-OR-

Plan C (3 credits)
Take the following course:
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
Twin Cities Campus
Physics Minor
School of Physics & Astronomy
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: physics@umn.edu
Website: https://cse.umn.edu/physics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Physics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.00.

The following courses cannot be applied to the minor: Physics 4001, 4002, 4101, 4201, and 4303.

Elective Courses (2 to 4 credits)
Master's students select 2 credits, and doctoral students select 4 credits from the following in consultation with the Physics director of graduate studies to complete minimum credit requirements.

Atomic Physics and Optics
PHYS 8161 - Atomic and Molecular Structure (3.0 cr)
Biophysics and Medical Physics
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 8300 - Seminar: Biological and Medical Physics. (1.0 cr)
PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
PHYS 8312 - Biological Physics of Macroscopic Systems (3.0 cr)

Condensed Matter Physics
PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 5750 - Advanced Topics in Quantum Mechanics and Quantum Information (3.0 cr)
PHYS 8014 - Quantum many Body Systems (3.0 cr)
PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)

Elementary Particle Physics
PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
PHYS 8011 - Quantum Field Theory I (3.0 cr)
PHYS 8012 - Quantum Field Theory II (3.0 cr)
PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)
PHYS 8901 - Elementary Particle Physics I (3.0 cr)
PHYS 8902 - Elementary Particle Physics II (3.0 cr)
PHYS 8911 - Introduction to Supersymmetry (3.0 cr)

Mathematical, Advanced Quantum, and Computational Physics
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)

Nuclear Physics
PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)
PHYS 8801 - Nuclear Physics I (3.0 cr)
PHYS 8802 - Nuclear Physics II (3.0 cr)
PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)

Plasma and Space Physics
PHYS 4611 - Introduction to Space Physics (3.0 cr)
PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
PHYS 5621 - Introduction to Plasma Physics (3.0 cr)
PHYS 8600 - Seminar: Space Physics (1.0 cr)
PHYS 8601 - Plasma Physics I (3.0 cr)
PHYS 8602 - Plasma Physics II (3.0 cr)
PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)

Relativity and Cosmology
PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)
PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
PHYS 8502 - General Relativity and Cosmology II (3.0 cr)

Physics Education
PHYS 5072 - Best Practices in College Physics Teaching (1.0 - 3.0 cr)
PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Course (4 credits)
Select 1 of the following in consultation with the Physics director of graduate studies:
PHYS 5001 - Quantum Mechanics I (4.0 cr)
or PHYS 5011 - Classical Physics I (4.0 cr)

Doctoral
Required Courses (8 credits)
Select 1 of the following course sequences in consultation with the Physics director of graduate studies:
Quantum Mechanics Sequence
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)

or Classical Physics Sequence
PHYS 5011 - Classical Physics I (4.0 cr)
PHYS 5012 - Classical Physics II (4.0 cr)
Twin Cities Campus
Physics Ph.D.
School of Physics & Astronomy
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: physics@umn.edu
Website: https://cse.umn.edu/physics

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Courses at the upper division level in the core areas of classical mechanics, electricity and magnetism, quantum mechanics, and statistical and thermal physics are encouraged. It is advisable to have taken an upper division course in experimental methods in physics.

Special Application Requirements:
Applicants are required to submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; and a clearly written statement of career interests, goals, and objectives. GRE scores are not required. Applications are accepted for fall semester only. The application deadline is December 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
40 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy the requirements.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B- earned for each course.

At least credits of 8000-level coursework, not including dissertation credits, are required.
The minimum GPA for the required core courses is 3.30.

Students holding TA appointments must take PHYS 5072 over 2 semesters for a total of 3 credits.

Required Core Courses (19 credits)
Take the following courses:
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5011 - Classical Physics I (4.0 cr)
PHYS 5012 - Classical Physics II (4.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)

Required Seminars (4 credits)
Complete PHYS 5980 for 2 credits. Select 2 additional seminars from the following in consultation with the advisor:
PHYS 5980 - Introduction to Research Seminar (1.0 cr)
PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)
PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)
PHYS 8300 - Seminar: Biological and Medical Physics. (1.0 cr)
PHYS 8600 - Seminar: Space Physics (1.0 cr)
PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)
PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)
PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)

Electives (17 credits)
Select courses from the following, in consultation with the advisor, to complete the 40 course credits required. Other courses may be chosen with approval of the advisor and director of graduate studies.

Students holding TA appointments must take PHYS 5072 over 2 semesters for a total of 3 credits.

Atomic Physics and Optics
PHYS 8161 - Atomic and Molecular Structure (3.0 cr)

Biophysics and Medical Physics
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 8300 - Seminar: Biological and Medical Physics. (1.0 cr)
PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
PHYS 8312 - Biological Physics of Macroscopic Systems (3.0 cr)

Condensed Matter Physics
PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 5750 - Advanced Topics in Quantum Mechanics and Quantum Information (3.0 cr)
PHYS 8014 - Quantum many Body Systems (3.0 cr)
PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)

Elementary Particle Physics

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Information current as of November 07, 2022
PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
PHYS 8011 - Quantum Field Theory I (3.0 cr)
PHYS 8012 - Quantum Field Theory II (3.0 cr)
PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)
PHYS 8901 - Elementary Particle Physics I (3.0 cr)
PHYS 8902 - Elementary Particle Physics II (3.0 cr)
PHYS 8911 - Introduction to Supersymmetry (3.0 cr)
Mathematical, Advanced Quantum, and Computational Physics
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)
Nuclear Physics
PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)
PHYS 8801 - Nuclear Physics I (3.0 cr)
PHYS 8802 - Nuclear Physics II (3.0 cr)
PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)
Plasma and Space Physics
PHYS 4611 - Introduction to Space Physics (3.0 cr)
PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
PHYS 5621 - Introduction to Plasma Physics (3.0 cr)
PHYS 8600 - Seminar: Space Physics (1.0 cr)
PHYS 8601 - Plasma Physics I (3.0 cr)
PHYS 8602 - Plasma Physics II (3.0 cr)
PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)
Relativity and Cosmology
PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)
PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
Physics Education
Students holding TA appointments must take PHYS 5072 over 2 semesters for a total of 3 credits.
PHYS 5072 - Best Practices in College Physics Teaching (1.0 - 3.0 cr)
PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)

Thesis Credits
Take 24 doctoral thesis credits after passing preliminary oral exam.
PHYS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Quaternary Paleoecology Minor
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Quaternary Paleoecology Graduate Program, University of Minnesota, John T. Tate Hall-Suite 150, 116 Church St. SE, Minneapolis, MN 55455 (612-624-7881; fax: 612-625-3819)
Email: qpminor@umn.edu
Website: https://cse.umn.edu/esci/graduate-minors#QPMinor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The faculty of the graduate minor in quaternary paleoecology (QP) hold appointments in several departments. Students in this unique program benefit from the broad range of expertise and experience available at a large research university. From their coursework in the minor, graduate students learn techniques and approaches from other areas that can be applied to their own research.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Quaternary Paleoecology director of graduate studies regarding feasibility and requirements.

Apply by sending a letter of application to the director of graduate studies (qpminor@umn.edu) with a letter of endorsement from the advisor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The Quaternary Paleoecology minor curriculum is developed in consultation with the major advisor and the Quaternary Paleoecology director of graduate studies. Courses must be from relevant disciplines outside the major field.

Courses offered on both the A-F and S/N grade basis must be taken A-F, with a minimum grade of C earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Minor Coursework (6 to 12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following list. Alternative coursework can be selected with approval from the major advisor and Quaternary Paleoecology director of graduate studies.
ANTH 4077 - Neanderthals: Biology and Culture of Humanity's Nearest Relative (3.0 cr)
ANTH 4329 - Primate Ecology and Social Behavior (3.0 cr)
ANTH 5009 - Human Behavioral Biology (3.0 cr)
ANTH 5015W - Biology, Evolution, and Cultural Development of Language & Music [SOCS, WI] (3.0 cr)
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
ANTH 5401 - The Human Fossil Record (3.0 cr)
ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
ANTH 5405 - Human Skeletal Analysis (4.0 cr)
ANTH 5442 - Archaeology of the British Isles (3.0 cr)
CEGE 5541 - Environmental Water Chemistry (3.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr)
CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)
EEB 4329 - Primate Ecology and Social Behavior (3.0 cr)
EEB 4329 - Biogeochemical Processes (3.0 cr)
EEB 5371 - Principles of Systematics (3.0 cr)
EEB 5609 - Ecosystem Ecology (3.0 cr)
ESCI 4102W - Vertebrate Paleontology: Evolutionary History and Fossil Records of Vertebrates [WI] (3.0 cr)
ESCI 4103W - Fossil Record of Mammals [WI] (3.0 cr)
ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 4602 - Sedimentology and Stratigraphy (3.0 cr)
ESCI 4703 - Glacial Geology (4.0 cr)
ESCI 5102 - Climate Change and Human History (3.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
ESCI 5302 - Isotope Geology (3.0 cr)
ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
ESCI 8243 - Principles of Rock Magnetism (1.0 - 3.0 cr)
ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
ESPM 5402 - Biometeorology (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
FNRM 5204 - Landscape Ecology and Management (3.0 cr)
FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNRM 5462 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
GEOG 5426 - Climatic Variations (3.0 cr)
GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
GEOG 5839 [Inactive](3.0 cr)
LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)
LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
SOIL 4511 - Field Study of Soils (2.0 cr)
SOIL 5555 - Wetland Soils (3.0 cr)
SOIL 8510 - Advanced Topics in Pedology (2.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Robotics M.S.
College of Science and Engineering - Adm
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Robotics Institute, Shepherd Laboratories, 100 Union St SE, Minneapolis, MN 55455
Email: mnri@umn.edu
Website: https://cse.umn.edu/mnri

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Robotics MS program provides a strong foundation in robotics by gathering in a single program the relevant knowledge, expertise, and educational assets such as robot modeling and control, perception using cameras and other sensors, and cognition to reason, plan, and make decisions.

Students who graduate from this regular 2-year masters program will learn the state-of-the-art methods for developing and using robots, be exposed to the cutting-edge technologies and theory forming the basis for the next generation of robots and their applications in areas such as agriculture, underwater exploration, autonomous driving, and manufacturing applications.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelors degree from an accredited college or university in an engineering field, computer science, physics, or mathematics.

Other requirements to be completed before admission:
Programming experience including basic algorithms and data structures that are normally taught in beginning computer science courses as part of the undergraduate degree, or subsequent work experience is required.

Applicants without some of the background preparation can be admitted, but will be required to complete some of the relevant undergraduate courses in addition to the MS requirements.

The GRE is recommended but not required.

Special Application Requirements:
Applications are accepted on a rolling basis.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 21 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 31 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The capstone project is completed in consultation with the faculty, or in collaboration with industry partners.

Plan C: Plan C requires 31 major credits and up to null credits outside the major. The final exam is no final exam. A capstone project is required.

Capstone Project: Plan C students must complete, in consultation with the advisor, one class project totaling 100 hours or two projects of 50 hours each.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N.

Required courses (9 credits)

Cognition (3 credits)

Select 3 credits from the following in consultation with the advisor:

- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)

Perception (3 credits)

Select 3 credits from the following in consultation with the advisor:

- CSCI 5561 - Computer Vision (3.0 cr)
- EE 5271 - Robot Vision (3.0 cr)
- EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)

Robot Modeling and Control (3 credits)

Select 3 credits from the following in consultation with the advisor:

- AEM 5321 - Modern Feedback Control (3.0 cr)
- CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
- CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
- EE 5231 - Linear Systems and Optimal Control (3.0 cr)
- ME 5286 - Robotics (4.0 cr)

Colloquium (1 credit)

Take the following:

- ROB 8970 - Robotics Colloquium (1.0 cr)

Electives (10-21 credits)

Plan A students select 10 to 11 credits, Plan B students select 14 to 18 credits, and Plan C students select 20 to 21 credits from the following in consultation with the advisor.

Up to 3 credits of ROB 5994 can be applied to degree requirements. Other courses may be selected with approval of the advisor and director of graduate studies.

- AEM 5321 - Modern Feedback Control (3.0 cr)
- AEM 5333 - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 8411 - Advanced Dynamics (3.0 cr)
- AEM 8421 - Robust Multivariable Control Design (3.0 cr)
- AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5541 - Natural Language Processing (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5563 - Multiview 3D Geometry in Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 8581 - Big Data in Astrophysics (4.0 cr)
DES 5185 - Human Factors in Design (3.0 cr)
DES 5901 - Principles of Wearable Technology (2.0 cr)
DES 5902 - Wearable Technology Laboratory Practicum (2.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5235 - Robust Control System Design (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5251 - Optimal Filtering and Estimation (3.0 cr)
EE 5271 - Robot Vision (3.0 cr)
EE 5373 - Data Modeling Using R (1.0 cr)
EE 5505 - Wireless Communication (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5622 - Physical Optics Laboratory (1.0 cr)
EE 5624 - Optical Electronics (4.0 cr)
EE 5705 - Electric Drives in Sustainable Energy Systems (3.0 cr)
EE 5707 - Electric Drives in Sustainable Energy Systems Laboratory (1.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EE 8581 - Detection and Estimation Theory (3.0 cr)
EE 8591 - Predictive Learning from Data (3.0 cr)
HUMF 5874 - Human Centered Design to Improve Complex Systems (4.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 5248 - Vibration Engineering (4.0 cr)
ME 5286 - Robotics (4.0 cr)
ME 8281 - Advanced Control System Design-1 (3.0 cr)
ME 8283 - Design of Mechatronic Products (4.0 cr)
ME 8285 - Control Systems for Intelligent Vehicle Applications (3.0 cr)
ROB 5994 - Directed Research (1.0 - 3.0 cr)

Plan Options

Plan A (10 credits)
Take 10 thesis credits.
ROB 8777 - Thesis Credits Master's (1.0 - 18.0 cr)

-OR-

Plan B (3 to 6 credits)
Take at least 3 credits of the following in consultation with advisor:
ROB 8760 - Capstone Project (1.0 - 3.0 cr)
Twin Cities Campus
Robotics Minor
College of Science and Engineering - Adm
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Robotics Institute, Shepherd Laboratories, 100 Union St SE, Minneapolis, MN 55455
Email: mnri@umn.edu
Website: https://cse.umn.edu/mnri

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Robotics minor is designed to familiarize master's students with the areas relevant to robotics, such as robot modeling and control; perception using cameras and other sensors; and cognition to reason, plan, and make decisions. Students will learn state-of-the-art methods for developing and using robots, and be exposed to cutting edge technologies and theories forming the basis for the next generation of robots and their applications in areas such as agriculture, underwater exploration, autonomous driving, and manufacturing applications.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Robotics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

The minimum cumulative GPA for minor field coursework is 3.00.

Required courses (9 credits)
Cognition (3 credits)
Select 3 credits from the following in consultation with the Robotics director of graduate studies:
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
Perception (3 credits)
Select 3 credits from the following in consultation with the Robotics director of graduate studies:
- CSCI 5561 - Computer Vision (3.0 cr)
- EE 5271 - Robot Vision (3.0 cr)
- EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
Robot Modeling and Control (3 credits)
Select 3 credits from the following in consultation with the Robotics director of graduate studies:

- AEM 5321 - Modern Feedback Control (3.0 cr)
- CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
- CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
- EE 5231 - Linear Systems and Optimal Control (3.0 cr)
- ME 5286 - Robotics (4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Twin Cities Campus
Security Technologies M.S.S.T.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
(612-624-5474; fax: 612-624-7510)
Email: msst@umn.edu
Website: https://cse.umn.edu/tli

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Security Technologies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Security Technologies (MSST) shapes tomorrow's analytical and risk management policy makers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. During the 21-month program and through a multidisciplinary systems approach, the program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. Through elective courses, students can focus on security systems technologies or security risk. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a related field, e.g. in biological or physical sciences, engineering, computer science, mathematics, statistics, social sciences, or public policy, is preferred.

Special Application Requirements:
Admission is for fall term only.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 26 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is an independent applied investigation, completed in consultation with the advisor, on a relevant issue in security technologies or homeland security.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

Core Courses (24 credits)

Take the following courses:

- MOT 8133 - Managerial Communication for Technological Leaders: Persuasive Writing and Speaking (2.0 cr)
- MOT 8214 - Technology Foresight and Forecasting (2.0 cr)
- MOT 8224 - Pivotal Technologies (1.0 cr)
- MOT 8501 - Leading Individual & Team Performance (1.5 cr)
- MOT 8502 - Innovation Leadership and Organizational Effectiveness (1.0 cr)
- ST 8109 - Cybersecurity Foundations - Technology, Risk & Communication (2.0 cr)
- ST 8111 - Methods, Theory, and Applications (2.5 cr)
- ST 8113 - Information and Cyber Security (2.0 cr)
- ST 8220 - Vulnerability, Risk and Threat Assessment and Management (2.5 cr)
- ST 8330 - Critical Infrastructure Protection (2.5 cr)
- ST 8331 - Dynamic Systems Modeling and Simulation Tools (2.0 cr)
- ST 8511 - Public Policy (1.0 cr)
- ST 8512 - Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics (2.0 cr)

Electives (6 credits)

Select 6 credits from the following. Other courses may be applied to this requirement with advisor and director of graduate studies approval.

- CI 5301 - Foundations of Computer Applications for Business and Education (3.0 cr)
- CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5471 - Modern Cryptography (3.0 cr)
- CSCI 8715 - Spatial Data Science Research (3.0 cr)
- ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
- GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
- GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
- GIS 5574 - Web GIS and Services (3.0 cr)
- GIS 5577 - Spatial Database Design and Administration (3.0 cr)
- HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
- IDSC 6041 - Information Technology Management (2.0 cr)
- IDSC 6051 - Information Technologies and Solutions (2.0 cr)
- IDSC 6423 - Enterprise Systems (2.0 cr)
- IDSC 6444 - Business Analytics for Managers I (2.0 cr)
- IDSC 6481 - Managerial Decision Making (2.0 cr)
- IDSC 8003 - Accounting and Information Systems (4.0 cr)
- IFSL 7031 - Food Security, Safety, and Defense (2.0 cr)
- LAW 6022 - LL.M. Legal Writing and Legal Skills II (3.0 cr)
- LAW 6103 - Data Privacy Law (3.0 cr)
- LAW 6832 - Cybercrime and Cybersecurity (2.0 cr)
- MATH 5248 - Cryptology and Number Theory (4.0 cr)
- MATH 5251 - Error-Correcting Codes, Finite Fields, Algebraic Curves (4.0 cr)
- MBA 6111 - Leading Others (2.0 cr)
- MBA 6301 - Strategic Management (3.0 cr)
- MGMT 6004 - Negotiation Strategies (2.0 cr)
- MGMT 6034 - Strategic Leadership (2.0 cr)
- MGMT 6084 - Management of Teams (2.0 cr)
- MGMT 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>OLPD 5607</td>
<td>Organization Development</td>
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<tr>
<td>OLPD 5611</td>
<td>Facilitation and Meeting Skills</td>
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<td>OLPD 5619</td>
<td>Planning and Decision-Making Skills</td>
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<tr>
<td>OLPD 6402</td>
<td>Integrative Leadership: Leading Across Sectors to Address Grand Challenges</td>
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<td>PA 5011</td>
<td>Management of Organizations</td>
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<td>PA 5105</td>
<td>Integrative Leadership: Leading Across Sectors to Address Grand Challenges</td>
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<td>PA 5405</td>
<td>Public Policy Implementation</td>
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<td>PA 5711</td>
<td>Science, Technology &amp; Environmental Policy</td>
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<tr>
<td>PA 5741</td>
<td>Risk, Resilience and Decision Making</td>
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<tr>
<td>PA 5984</td>
<td>Elections Security: How to Protect America's Elections</td>
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<td>POL 8402</td>
<td>International Security</td>
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<tr>
<td>PUBH 5231</td>
<td>Emergency Preparedness: A Public Health Perspective</td>
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<tr>
<td>PUBH 6112</td>
<td>Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6123</td>
<td>Violence Prevention and Control: Theory, Research, and Application</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6182</td>
<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6571</td>
<td>Quality, Patient Safety, and Performance Improvement</td>
<td>2.0 cr</td>
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<td>PUBH 6702</td>
<td>Integrative Leadership Seminar</td>
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<td>PUBH 7214</td>
<td>Principles of Risk Communication</td>
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<tr>
<td>PUBH 7221</td>
<td>Planning for Urgent Threats</td>
<td>1.0 cr</td>
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<td>PUBH 7225</td>
<td>Communication and Information Technology Tools for Public Health Emergency Response</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 7227</td>
<td>Incident Management Systems: The Public Health Role</td>
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<tr>
<td>PUBH 7233</td>
<td>Food System Defense: Vulnerabilities in the Food System</td>
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<tr>
<td>PUBH 7242</td>
<td>War and Public Health</td>
<td>1.0 cr</td>
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<td>SCO 6059</td>
<td>Quality Management and Lean Six Sigma</td>
<td>4.0 cr</td>
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<td>SCO 8892</td>
<td>Readings in Supply Chain and Operations</td>
<td>1.0 - 8.0 cr</td>
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<tr>
<td>SOC 6412</td>
<td>Social Network Analysis: Theory and Methods</td>
<td>3.0 cr</td>
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<tr>
<td>ST 8200</td>
<td>Special Topics in Security Technologies</td>
<td>0.5 cr</td>
</tr>
<tr>
<td>ST 8441</td>
<td>Internship (optional)</td>
<td>0.5 cr</td>
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<tr>
<td>VMED 5920</td>
<td>Food Defense: Prepare, Respond, Recover</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>WRIT 5001</td>
<td>Introduction to Graduate Studies in Scientific and Technical Communication</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>WRIT 5112</td>
<td>Information Design: Theory and Practice</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>WRIT 5561</td>
<td>Editing and Style for Technical Communicators</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Capstone Project (2 credits)**

Take 2 credits of the following in consultation with the advisor:

**ST 8620 - Capstone (0.5 - 2.0 cr)**
Twin Cities Campus
Security Technologies Minor
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
(612-624-5474; fax: 612-624-7510)
Email: msst@umn.edu
Website: https://cse.umn.edu/tli

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Security Technologies graduate program shapes tomorrow's analytical and risk management policy makers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. The program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Security Technologies director of graduate studies regarding feasibility and requirements.

Applicants must be interviewed for admission by the Security Technologies director of graduate studies or designate. An exception to the interview requirement may be waived, but only in rare circumstances.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for the minor is 3.00.

Required Courses (9 to 12 credits)
Master's students select 9 credits, and doctoral students select 12 credits from the following in consultation with the Security Technologies director of graduate studies, to meet minimum credit requirements.

ST 8109 Cybersecurity Foundations - Technology, Risk & Communication (2.0 cr)
ST 8111 - Methods, Theory, and Applications (2.5 cr)
ST 8113 - Information and Cyber Security (2.0 cr)
ST 8200 - Special Topics in Security Technologies (0.5 cr)
ST 8220 - Vulnerability, Risk and Threat Assessment and Management (2.5 cr)
ST 8330 - Critical Infrastructure Protection (2.5 cr)
ST 8331 - Dynamic Systems Modeling and Simulation Tools (2.0 cr)
ST 8511 - Public Policy (1.0 cr)
ST 8512 - Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics (2.0 cr)
ST 8661 - Securing Cyberspace (Fundamentals) (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Software Engineering M.S.S.E.
Computer Science and Engineering
College of Science and Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Software Engineering (MSSE) program provides a thorough understanding of the fundamental issues related to software development and the software development process. The MSSE curriculum provides a solid grounding in theoretical methods, principles, and tools, and an examination of fundamental software development issues and processes. These concepts are explored using realistic and relevant case examples and projects to ensure that the theory works in practice. The MSSE program is an interdisciplinary program administered by the College of Science and Engineering's Department of Computer Science and Engineering.

The program is offered in a format designed for full-time working professionals. Students take courses one day per week (alternating Fridays and Saturdays) and move through the curriculum as a cohort, taking all classes together for four semesters.

Program Delivery
This program is available:
  • via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Prospective students should have an undergraduate degree in computer science or a closely related field.

Other requirements to be completed before admission:
Students with degrees in other fields may be considered for admission based on relevant work experience.

Prospective applicants should have a minimum of one year of professional experience working in the software industry.

Because the MSSE program is designed for full-time working professionals, international applicants typically hold an H-1B visa.

Special Application Requirements:
Admission is for fall semester only. The early application deadline is February 28. The final deadline is June 30.

International applicants must submit score(s) from one of the following tests:
  • TOEFL
    - Internet Based - Total Score: 79
    - Internet Based - Writing Score: 21
    - Internet Based - Reading Score: 19
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

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Information current as of November 07, 2022
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of C earned for each course.

Semester 1 (7 credits)
Take the following courses:
- SENG 5707 - The Principles of Database Systems (3.0 cr)
- SENG 5801 - Software Engineering I: Overview, Requirements, and Modeling (3.0 cr)
- SENG 5899 - Software Engineering Seminar (1.0 cr)

Semester 2 (8 credits)
Take the following courses:
- SENG 5802 - Software Engineering II: Software Design (3.0 cr)
- SENG 5811 - Software Testing and Verification (3.0 cr)
- SENG 5852 - Quality Assurance and Process Improvement (2.0 cr)

Semester 3 (7 credits)
Take the following courses:
- SENG 5851 - Software Project Management (3.0 cr)
- SENG 5861 - Introduction to Software Architecture (3.0 cr)
- SENG 5899 - Software Engineering Seminar (1.0 cr)

Semester 4 (8 credits)

Required Course (2 credits)
Take the following course:
- SENG 5115 - Graphical User Interface Design, Evaluation, and Implementation (2.0 cr)

Electives (6 credits)
Select 6 credits from the following, in consultation with the advisor, to complete the 30-credit minimum:
- SENG 5130 - Introduction to Internet of Things: Systems-Level Design and Experimentation (3.0 cr)
- SENG 5133 - Cloud Computing - Leading Technical Change (3.0 cr)
- SENG 5199 - Topics in Software Engineering (2.0 - 3.0 cr)
- SENG 5271 - Cybersecurity (3.0 cr)
- SENG 5511 - Artificial Intelligence (2.0 - 3.0 cr)
- SENG 5708 - Data Analytics (2.0 - 3.0 cr)
- SENG 5709 - Big Data Engineering and Analytics (3.0 cr)
- SENG 5831 - Software Development for Real-Time Systems (2.0 - 3.0 cr)
- SENG 5841 - Model-based Development (3.0 cr)
- SENG 8891 - Independent Project (2.0 - 6.0 cr)
Twin Cities Campus
Stream Restoration Science and Engineering Postbaccalaureate Certificate
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Stream Restoration Graduate Certificate Program, National Center for Earth-surface Dynamics, Saint Anthony Falls Laboratory, 2 Third Avenue SE, Minneapolis, MN 55414 (612-624-4363)
Email: volle001@umn.edu
Website: http://www.nced.umn.edu/apply-certificate-program-stream-restoration

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Stream Rest. Science & Engineering PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Stream Restoration Science and Engineering post-baccalaureate certificate is a three-semester program producing graduates who understand how to blend engineering, physical, biological, and social sciences in prioritizing, designing, implementing, and evaluating stream restoration projects.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a field related to ecology, civil engineering, or environmental and earth sciences from an accredited US institution or its foreign equivalent.

Other requirements to be completed before admission:
In addition to the University's online application form, students must submit a program application and one letter of reference.

Applications are accepted throughout the year, although it is preferable to start the program in fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.
Courses offered on both the A-F and S/N grade basis must be taken A-F.

The minimum cumulative GPA for coursework is 3.00.

**Foundation Course (3 credits)**
Select 1 of the following courses in consultation with the advisor.

- CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
- or EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- or ESCI 8601 - Introduction to Stream Restoration (3.0 cr)

**Elective Coursework (11 credits)**
Select electives from the following in consultation with the advisor. Other courses may be selected with advisor and director of graduate studies approval.

- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- CEGE 4511 - Hydraulic Structures (3.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 4563 - Pollutant Fate and Transport: Processes and Modeling (3.0 cr)
- CEGE 5512 - Stochastic Ecohydrology (3.0 cr)
- CEGE 5515 -Remote Sensing of Environment and Water Resources (3.0 cr)
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- CEGE 8541 - Aquatic Chemistry (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- ESCI 4701 - Geomorphology (4.0 cr)
- ESCI 4702 - General Hydrogeology (4.0 cr)
- ESPM 4295W - GIS in Environmental Science and Management [WI] (4.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- WRS 5101 - Water Policy (3.0 cr)

**Capstone Course (2 credits)**
Select 1 of the following courses in consultation with the advisor.

- CEGE 8602 - Stream Restoration Practice (2.0 cr)
- or EEB 8602 - Stream Restoration Practice (2.0 cr)
- or ESCI 8602 - Stream Restoration Practice (2.0 cr)
Twin Cities Campus

Comparative and Molecular Biosciences M.S.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 434 VMC, Saint Paul, MN 55108; cvmmsphd@umn.edu
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/cmb

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Comparative and Molecular Biosciences (CMB) program is to train outstanding scientists in the basic mechanisms of animal and human health and disease. The CMB program embraces a One Health approach and investigates a wide range of species, including humans, laboratory animals, companion animals, and livestock species.

The CMB program is transdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training. Areas of emphasis include genetic and infectious diseases, and comparative aspects of biology and pathology across animal species and humans. Students receive scientific training that prepares them for careers as independent investigators and educators in academia, industry, and government.

The purpose of the master's degree is to provide technical training and scientific competence in the basic mechanisms of animal and human health and disease.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A bachelor's degree in a biological or basic science is required. Previous laboratory experience is strongly preferred.

Other requirements to be completed before admission:
Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 1 is required to ensure consideration for fall semester admission.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5

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Information current as of November 07, 2022
The preferred English language test is the Test of English as Foreign Language (TOEFL).

Key to test abbreviations: (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**CMB Program Courses (11 credits)**

*Take the following courses. CMB 8550 must be taken twice for a total of 2 credits.*

- CMB 8134 - Ethical Conduct of Animal Research (3.0 cr)
- CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
- CMB 8303 - Comparative Models of Disease (2.0 cr)
- CMB 8550 - Comparative and Molecular Biosciences Seminar (1.0 cr)
- CMB 8560 - Research and Literature Reports (1.0 cr)

**Statistics (3 to 4 credits)**

Select one of the following courses in consultation with an adviser.

- CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
- or CMB 5915 - Essential Statistics for Life Sciences (3.0 cr)
- or CMB 8910 - Statistical Principles of Research Design (3.0 cr)
- or PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6451 - Biostatistics II (4.0 cr)
- or STAT 5021 - Statistical Analysis (4.0 cr)
- or STAT 5302 - Applied Regression Analysis (4.0 cr)
- or STAT 5303 - Designing Experiments (4.0 cr)
- or STAT 5421 - Analysis of Categorical Data (3.0 cr)

**Additional coursework (5 to 6 credits)**

Select coursework, in consultation with the advisor, to complete the 20 course credits required. Other courses may be selected with advisor approval.

- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- or MICA 8003 - Immunity and Immunopathology (4.0 cr)
- or MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- or MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
- or MICA 8010 - Microbial Pathogenesis (3.0 cr)
- or BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- or BIOC 6021 - Biochemistry (3.0 cr)
- or BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- or GCD 5036 - Molecular Cell Biology (3.0 cr)
- or GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- or GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
- or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- or GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- or GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
- or CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
- or CMB 5340 - Structural Biology in Biomedical Research (2.0 cr)
- or CMB 5571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
- or CMB 5594 - Directed Research in Comparative and Molecular Biosciences (1.0 - 4.0 cr)
- or CMB 5910 - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
- or CMB 8208 - Neuropsychopharmacology (3.0 cr)
or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
or CMB 8361 - Neuro-Immune Interactions (3.0 cr)
or CMB 8371 - Mucosal Immunobiology (3.0 cr)
or CMB 8481 - Advanced Neuropharmaceutics (4.0 cr)
or CMB 8571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)

Thesis credits
Take 10 master's thesis credits.
CMB 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Comparative and Molecular Biosciences Ph.D.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: https://vetmed.umn.edu/education-training/ms-phd-programs/ms-phd-comparative-and-molecular-biosciences

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Comparative and Molecular Biosciences (CMB) program is to train outstanding scientists in the basic mechanisms of animal and human health and disease. The CMB program embraces a One Health approach and investigates a wide range of species, including humans, laboratory animals, companion animals, and livestock species.

The CMB program is transdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training. Areas of emphasis include genetic and infectious diseases, cancer biology, and comparative aspects of biology and pathology across animal species and humans. Students receive scientific training that prepares them for careers as independent investigators and educators in academia, industry, and government.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A bachelor's degree in a biological or basic science is required. Previous research experience is expected.

Other requirements to be completed before admission:
Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 1 is required to ensure consideration for admission, fellowships, and research assistantships awarded for the next academic year. https://www.vetmed.umn.edu/education-training/ms-phd-programs/ms-phd-comparative-and-molecular-biosciences

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The PhD requires a minimum of 24 course credits and 24 thesis credits. The 24 course credits include 15 credits of CMB program courses. A statistics course is required. A minimum of 6 additional course credits from the biological sciences are also required. In addition, all students are required to complete a teaching experience.

CMB program courses
A minimum of 15 course credits are required. CMB 8100 must be taken twice and CMB 8550 must be taken twice.
CMB 5910 - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
CMB 8100 - Research Rotation in Comparative and Molecular Biosciences (1.0 cr)
CMB 8134 - Ethical Conduct of Animal Research (3.0 cr)
CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
CMB 8303 - Comparative Models of Disease (2.0 cr)
CMB 8550 - Comparative and Molecular Biosciences Seminar (1.0 cr)
CMB 8560 - Research and Literature Reports (1.0 cr)

Statistics
One of the following statistics courses is required.
CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
or CMB 5915 - Essential Statistics for Life Sciences (3.0 cr)
or CMB 8910 - Statistical Principles of Research Design (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5421 - Analysis of Categorical Data (3.0 cr)

Additional courses
A minimum of 6 course credits are required, selected from the following list or in consultation with the advisor. Students may take GRAD 8101 OR GRAD 8200 but not both, and these cannot be applied toward the degree requirements.
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
or BIOC 6021 - Biochemistry (3.0 cr)
or BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
or CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
or CMB 5340 - Structural Biology in Biomedical Research (2.0 cr)
or CMB 5571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
or CMB 8208 - Neuropsychopharmacology (3.0 cr)
or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
or CMB 8361 - Neuro-Immune Interactions (3.0 cr)
or CMB 8371 - Mucosal Immunobiology (3.0 cr)
or CMB 8894 - Research in Comparative Biomedical Sciences (1.0 - 6.0 cr)
or CMB 8481 - Advanced Neuropharmaceutics (4.0 cr)
or CMB 8571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
or GCD 5036 - Molecular Cell Biology (3.0 cr)
or GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
or GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
or GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
or GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
or MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
or MICA 8003 - Immunity and Immunopathology (4.0 cr)
or MICA 8004 - Cellular and Cancer Biology (4.0 cr)
or MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
or MICA 8010 - Microbial Pathogenesis (3.0 cr)

**Thesis Credits**
Take at least 24 doctoral thesis credits

**CMB 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Poultry Health Postbaccalaureate Certificate

College of Veterinary Medicine - Adm

College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
CVM OGP
1365 Gortner Ave., 443 VMC
St. Paul, MN 55108
612-624-7413
Email: cvmmsphd@umn.edu
Website: https://poultrytraining.umn.edu/

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 12
• This program requires summer semesters for timely completion.
• Degree: Poultry Health Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Poultry Health post-baccalaureate certificate is a 12-credit, 12-month online program designed for early- to mid-career professionals interested in advanced understanding of poultry health and disease. The certificate focuses on basic understanding of the avian host as it relates to poultry production systems, the technologies and tools to assess health, and diagnosing and addressing disease at the gross and molecular levels. The enhanced knowledge and hands-on experience with applied and/or molecular tools will position graduates to deal with commonly encountered and investigated issues that arise in poultry production and allied industries. In addition to the online curriculum, elective experiential credits are offered by the Mid-Central Research and Outreach Center in Willmar, MN.

Program Delivery

This program is available:
• primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:

International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Courses (9 credits)

Take the following courses:

POUL 5101 - Living in a microbial world and raising animals: the poultry perspective (3.0 cr)
PoUL 5102 - How safe is your chicken? Food safety from a poultry perspective (3.0 cr)
POUL 5103 - Poultry biosecurity: framework for healthy production (3.0 cr)

Electives (3 credits)

Select 3 credits from the following, in consultation with the advisor, to complete the 12-credit minimum:

POUL 5001 - Avian Anatomy and Physiology (1.0 cr)
POUL 5002 - Poultry Nutrition (1.0 cr)
POUL 5003 - Poultry Diseases (1.0 cr)
POUL 5013 - Animal Welfare (1.0 cr)
POUL 5015 - Broiler/Layer/Turkey Rotation (1.0 cr)
POUL 5016 - Capstone in Molecular Technologies (1.0 cr)
Twin Cities Campus
Veterinary Medicine M.S.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108
Email: cvmmsphtd@umn.edu
Website: http://www.vetmed.umn.edu/education-training/ms-phd-programs

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The veterinary medicine graduate program focuses on the scientific study of the mechanisms of transmission and progression of diseases of importance to domestic animals, wildlife and humans with applications to diagnosis, prevention, and treatment. Includes training in infectious and noninfectious disease, epidemiology, environmental biology, ethology, anatomical, clinical and molecular pathobiology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

DVM or equivalent; students with a BA or BS in biological sciences may be considered. Previous laboratory experience is preferred.

Other requirements to be completed before admission:
Applicants must submit a CV or résumé, three letters of recommendation from persons familiar with their scholarship and research potential, and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 1 is required to ensure consideration for admission, fellowships, and research assistantships awarded for the next academic year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses (9 credits)
Take the following courses. VMED 8550 must be taken twice for a total of 2 credits.

VMED 5190 - Effective Science Communication (2.0 cr)
VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
VMED 8134 - Ethical Conduct of Animal Research (3.0 cr)
VMED 8550 - Veterinary Medicine Seminar (1.0 cr)

Statistics
Select at least 3 credits from the following in consultation with the advisor. Two statistics are recommended, but not required.
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 8910 - Statistical Principles of Research Design (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)

8xxx-level Coursework
Select at least 1 course from the following in consultation with the advisor. CMB 8202 is recommended.
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
CMB 8303 - Comparative Models of Disease (2.0 cr)
CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
CMB 8571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)
VMED 8394 - Research in Veterinary Medicine (1.0 - 3.0 cr)
VMED 8492 - Seminar: Infectious Diseases and Swine Medicine (1.0 cr)
VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)

Additional Biological Sciences Coursework
Select at least 7 credits from the following in consultation with the advisor:
VPM 4131 - Immunology (3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
VMED 5182 - Molecular biology for the Public Health Professional (2.0 cr)
VMED 5190 - Effective Science Communication (2.0 cr)
VMED 5442 - Quantitative Methods for Population Health (3.0 cr)
VMED 5594 - Research in Veterinary Medicine (1.0 - 4.0 cr)
VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
VMED 5920 - Food Defense: Prepare, Respond, Recover (3.0 cr)
VMED 5921 - Protecting your Lunch: Food Defense Awareness (1.0 cr)
CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
CMB 5340 - Structural Biology in Biomedical Research (2.0 cr)
CMB 5571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
CMB 8303 - Comparative Models of Disease (2.0 cr)
CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
CMB 8571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)
VMED 8394 - Research in Veterinary Medicine (1.0 - 3.0 cr)
VMED 8492 - Seminar: Infectious Diseases and Swine Medicine (1.0 cr)
VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)
VMED 5440 - Using Risk Analysis Tools: Estimating Food Safety Risks on the Farm to Table Continuum (2.0 cr)

Thesis Credits
Take 10 master's thesis credits.
CMB 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
**Twin Cities Campus**

**Veterinary Medicine Ph.D.**

*College of Veterinary Medicine - Adm*

**College of Veterinary Medicine**

Link to a [list of faculty](#) for this program.

**Contact Information:**

College of Veterinary Medicine, 1365 Gortner Avenue, Room 434 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)

Email: cvmmsphd@umn.edu

Website: [https://vetmed.umn.edu/education-training/ms-and-phd-programs/ms-and-phd-veterinary-medicine](https://vetmed.umn.edu/education-training/ms-and-phd-programs/ms-and-phd-veterinary-medicine)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- NO
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The veterinary medicine graduate program focuses on the scientific study of the mechanisms of transmission and progression of diseases of importance to companion animals, livestock, and humans with applications to diagnosis, prevention, and treatment. Includes training in infectious and noninfectious disease, epidemiology, environmental biology, ethology, anatomical, clinical and molecular pathobiology.

**Accreditation**

This program is accredited by NA

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.25.

DVM or equivalent; students with a BA or BS in biological sciences may be considered. Previous laboratory experience is strongly preferred.

Other requirements to be completed before admission:

Applicants must submit a CV or resume; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

**Special Application Requirements:**

Submission of all application materials by December 1 is required to ensure consideration for fellowships and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

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Information current as of November 07, 2022
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

VMED Program Courses
Take the following courses for 9 credits. VMED 8550 must be taken twice.
VMED 5190 - Effective Science Communication (2.0 cr)
VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
VMED 8134 - Ethical Conduct of Animal Research (3.0 cr)
VMED 8550 - Veterinary Medicine Seminar (1.0 cr)

Statistics Requirement
Take at least one statistics course, in consultation with the advisor. Two statistics courses are preferred.
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 8910 - Statistical Principles of Research Design (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)

Additional Graduate-Level Coursework Requirement
Take at least three graduate-level biological sciences (totaling at least seven credits) courses from the following list, or select others, in consultation with the advisor.

These courses cannot be seminars or journal clubs; prefer each course to be 8000-level and at least two credits.

5000-level courses must be PAC-approved. CMB 8202 is recommended.
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
CMB 8100 - Research Rotation in Comparative and Molecular Biosciences (1.0 cr)
CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
CMB 8303 - Comparative Models of Disease (2.0 cr)
CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
CMB 8571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)

Additional Coursework
Take additional courses from the following list, or select others in consultation with the advisor, to complete the minimum course credit requirement.
VPM 4131 - Immunology (3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
VMED 5182 - Molecular biology for the Public Health Professional (2.0 cr)
VMED 5190 - Effective Science Communication (2.0 cr)
VMED 5442 - Quantitative Methods for Population Health (3.0 cr)
VMED 5594 - Research in Veterinary Medicine (1.0 - 4.0 cr)
VMED 5596 - Swine Diseases and Diagnostics (2.0 - 3.0 cr)
VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
VMED 5921 - Protecting your Lunch: Food Defense Awareness (1.0 cr)
CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
CMB 5340 - Structural Biology in Biomedical Research (2.0 cr)
CMB 5571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
VMED 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Accountancy M.Acc
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Master Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue S, Minneapolis, MN 55455 (612-624-7511; fax: 612-626-7795)
Email: macct@umn.edu
Website: http://www.carlsonschool.umn.edu/degrees/master-accountancy

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 44
- This program does not require summer semesters for timely completion.
- Degree: Master of Accountancy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Accountancy (MAcc) program enables all students to understand technical accounting problems from an analytical approach, enhancing their critical thinking and management skills with graduate-level courses in accounting, data analytics, finance, taxation, information systems, management, and supply chain and operations. In addition, it provides non-accounting majors the opportunity to take the accounting courses required to sit for the CPA examination.

The MAcc program offers two tracks, a 30-credit track for students with a degree in accounting or finance. The 44-credit track is for students with a bachelor's degree in an academic discipline other than accounting or finance. The additional required core courses include the necessary accounting courses needed to sit for the CPA exam.

The curriculum has been designed and developed by Carlson School of Management faculty with extensive input and ongoing consultation with executives from the professional community. This ensures relevant, practical, and challenging courses that enhance the students' professional development. The program offers students the opportunity to delve more deeply into challenging financial reporting issues faced by organizations. Students develop complex computational analysis skills and analytical processes to better understand modern financial reporting issues.

The 30-credit track can be completed in one year if going full-time. The 44-credit track can be completed in 1.5 years if going full-time. Students may also choose to go part-time. Many of the courses are offered in the evenings (Monday-Thursday, 5:45  9:05 p.m.) or online.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
All applicants must have a bachelor's degree from an accredited college or university and a cumulative undergraduate grade point average of 3.0 (on a 4.0 scale) or higher.

Applicants with a bachelor's degree in accounting (or equivalent coursework) or finance are generally eligible for the 30-credit MAcc track.

Students who have a bachelor's degree in an academic discipline other than accounting or finance are eligible to apply for the MAcc program and take the 44-credit track. The following courses (or equivalents) are prerequisites to the MAcc courses: ACCT 2051 Financial Accounting, ACCT 3001 Management Accounting, ACCT 5101 Intermediate Accounting I, FINA 3001 Finance Fundamentals (or be required to take MBA 6231 Financial Management in the MAcc program). If necessary, some of the prerequisite courses can be taken after being admitted to the MAcc program but credits would not apply to the 44-credit requirement. Coursework will be evaluated after applying.

Special Application Requirements:
Summer/Fall application deadline: February 1 priority, followed by rolling admission until program is full.
Spring application deadline: October 1 priority, followed by rolling admission until program is full.

Applicants must submit all application materials through the University's online application system. Application materials include:

- Personal Statement and Diversity statement
- Unofficial Transcripts
- Three letters of recommendation from persons qualified to evaluate most recent work and potential for graduate study
- International students and domestic applicants whose first language is not English must provide proof of English language proficiency by submitting results from one of the following English language tests: TOEFL, IELTS. TOEFL scores must be received directly from TOEFL. IELTS scores must be received directly from the testing center.

For additional application details, review the M.Acc. admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 30 to 44 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students in the 30-credit MAcc track are required to have completed the following courses (or equivalent courses) in their undergraduate program or complete them in their MAcc program. If required to take any of these courses in the MAcc program, the number of elective credits is reduced by that number of credits.

- ACCT 5102 Intermediate Accounting II, 4 cr
- ACCT 5125W Auditing, 4 cr
- ACCT 5135 Fundamentals of Federal Income Tax, 4 cr
- ACCT 5201 Intermediate Management Accounting, 2 cr

**Required Courses (14 Credits)**

All MAcc students must complete the following courses for 14 credits. If 5000 level course was taken in undergraduate program, replace with elective course.

- ACCT 5161 - Financial Statement Analysis (2.0 cr)
- ACCT 5181 - Consolidations and Advanced Reporting (2.0 cr)
- ACCT 5236 - Introduction to Taxation of Business (2.0 cr)
- ACCT 6601 - Internal Control (2.0 cr)
- ACCT 6602 - Securities and Exchange Commission (SEC) and Standard Setting (2.0 cr)
- ACCT 6606 - Financial Data Analytics (2.0 cr)
- IDSC 6003 - Accounting and Information Systems (2.0 cr)

**Additional Courses Required for the 44-Credit Track (17 Credits)**

Students pursuing the 44-credit track must also complete the following courses for 17 credits:

- ACCT 5102 - Intermediate Accounting II (4.0 cr)
- ACCT 5125W - Auditing Principles and Procedures [WI] (4.0 cr)
- ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
- ACCT 5201 - Intermediate Management Accounting (2.0 cr)
- MBA 6231 - Financial Management (3.0 cr)

**Elective Courses (16 credits)**

MAcc students must complete at least 13 - 16 elective credits to reach their total credits required (30 or 44), selected in consultation with the advisor, from the following list. In some cases, graduate-level courses from outside this list may be taken with prior approval from the MAcc Director.

- ACCT 5126 - Internal Auditing (2.0 cr)
- ACCT 5311 - International Accounting (2.0 cr)
- ACCT 5320 - Financial Reporting Data Analytics (2.0 cr)
- ACCT 6603 - Advanced Auditing (2.0 cr)
- BLAW 6158 - The study of laws affecting private business and publicly-traded companies (2.0 cr)
- FINA 6111 - Financing over a Firm's Lifecycle (1.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FINA 6112</td>
<td>Private Equity</td>
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<tr>
<td>FINA 6113</td>
<td>Public Equity</td>
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<tr>
<td>FINA 6121</td>
<td>Debt Markets, Interest Rates, and Hedging</td>
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<td>FINA 6123</td>
<td>Financial Services Industry</td>
<td>2.0 cr</td>
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<tr>
<td>FINA 6125</td>
<td>Cryptocurrency, Blockchain, and Their Business Applications</td>
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<tr>
<td>FINA 6211</td>
<td>Cash Flows and Project Selection</td>
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<td>FINA 6212</td>
<td>Working Capital Management</td>
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<td>FINA 6213</td>
<td>Financial Capital Structure</td>
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<td>FINA 6214</td>
<td>Business Valuation</td>
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<tr>
<td>FINA 6215</td>
<td>The CFO Mindset: Finance, Strategy and Operations</td>
<td>1.0 cr</td>
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<tr>
<td>FINA 6222</td>
<td>Mergers and Acquisitions</td>
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<td>FINA 6322</td>
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<td>FINA 6323</td>
<td>Advanced Financial Modeling</td>
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<td>IDSC 6423</td>
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<td>MBA 6121</td>
<td>Data Analysis and Statistics for Managers</td>
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<td>MBA 6301</td>
<td>Strategic Management</td>
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<td>The Ethical Environment of Business</td>
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<td>MTB 6201</td>
<td>Tax Accounting Methods I</td>
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<td>Tax Accounting Methods II</td>
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<td>MTB 6221</td>
<td>Tax Research, Communication, and Practice</td>
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<td>MTB 6231</td>
<td>Corporate Taxation I</td>
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<td>MTB 6346</td>
<td>ASC 740 Computations and Analysis</td>
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<td>MTB 6347</td>
<td>Tax Technology and Analytics Fundamentals</td>
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<td>MTB 6371</td>
<td>Taxation of Property Transactions</td>
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<td>MTB 6383</td>
<td>Transfer Pricing</td>
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<td>MGMT 6004</td>
<td>Negotiation Strategies</td>
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<td>MGMT 6085</td>
<td>Corporate Strategy</td>
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<tr>
<td>MGMT 6305</td>
<td>The International Environment of Business</td>
<td>4.0 cr</td>
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<td>MGMT 6310</td>
<td>Cross-Cultural Management: Developing Intercultural Competence</td>
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<td>MGMT 6411</td>
<td>Corporate Responsibility</td>
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</tr>
<tr>
<td>SCO 6041</td>
<td>Project Management</td>
<td>2.0 cr</td>
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</table>
Twin Cities Campus
Applied Business Analytics M.A.B.A.
Information & Decision Sciences
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Master of Applied Business Analytics Program
Carlson School of Management
University of Minnesota
321 19th Ave S, Room 1-110
Minneapolis, MN 55455

Phone: 612-625-5555
Email: maba@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-applied-business-analytics

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Applied Business Analytics

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Applied Business Analytics program provides a strong foundation in business analytics by combining technical know-how that includes machine learning, artificial intelligence, applied statistics, optimization, econometrics, experimentation, data visualization, data engineering and big data with an understanding on how they may be applied in domains such as marketing, consumer behavior, operations, financial and risk management, information management, and strategic management in both public and private sectors. Students who graduate from this part-time, two-year, 32-credit program will have the substantial quantitative capabilities and technical expertise to create business and social value by extracting useful insights from data and providing data-driven solutions to business problems for a variety of career settings. HyFlex course delivery provides students with the freedom to flex between an online and in-person experience.

Accreditation
This program is accredited by AACSB International.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
- Applicants must have completed at least one semester college-level math course (e.g. Calculus, Linear Algebra).
- Demonstrated competency in computer programming in at least one of the following computer programming languages is required: Python, R, C, C++, C#, VB, Java, or PHP. Academic transcripts, certificates from online courses, or work experience may be cited to meet this requirement.

Special Application Requirements:
Applicants must submit all application materials through the University's admissions system. Application materials include:
- Online application & application fee.
- Transcripts from all colleges/universities previously attended. Non-English transcripts must be accompanied by an English translation.
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score. A GMAT/GRE waiver is available for qualified candidates.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (IELTS).
- Two letters of recommendations need to be submitted through the online application.
- A personal statement (max. 2 pages). Please answer each prompt as a separate short essay. (1) Why are you interested in studying at the Carlson School of Management at the University of Minnesota? What draws you to the Carlson School’s Master of Applied Business Analytics (MABA) program specifically? (2) Briefly discuss your short- and long-term career goals. How will completing the Business Analytics program at this time help you toward achieving your goals? (3) An aptitude for technical and quantitative work is necessary for success in the MABA program. Please provide a specific example(s) from your past academic project, internship, or professional experience where you used a technical/quantitative tool or method to solve a problem. Please provide details describing the problem/situation; the actions you took; the specific tools, programming languages, and methods you used; and the results of your actions.
- Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Video Essay.
- Admissions interview (by invitation only).

For admissions details, please visit https://carlsonschool.umn.edu/degrees/master-applied-business-analytics/admissions

Applicants must submit their test score(s) from the following:
• GRE
• GMAT

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 32 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** Students complete MABA 6511, in which they engage in an experiential-learning application of the analytics methodologies, techniques, and tools learned throughout the program to a real-world problem. The final project consists of the development and presentation of results, interpretations, insights, and recommendations.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

**Required Courses (24 credits)**

Take the following courses:
- MABA 6121 - Practical Statistics for Business Applications (2.0 cr)
- MABA 6131 - Mathematics Essentials for Business Analytics (2.0 cr)
- MABA 6141 - Ethics, Data Privacy, and Governance (1.0 cr)
- MABA 6251 - AI for Competitive Advantage (2.0 cr)
- MABA 6311 - Programming for Business Analytics (2.0 cr)
- MABA 6321 - Data Management and Big Data (2.0 cr)
- MABA 6341 - Data Visualization (2.0 cr)
- MABA 6411 - Exploratory Data Analytics (2.0 cr)
- MABA 6421 - Predictive Analytics (2.0 cr)
- MABA 6431 - Advanced Topics on Business Analytics (2.0 cr)
- MABA 6441 - Causal Inference via Econometrics and Experimentation (2.0 cr)
- MABA 6451 - Prescriptive Analytics (2.0 cr)
- MABA 6490 - Special Topics in Applied Business Analytics (1.0 cr)

**Capstone Course (4 credits)**

Take the following course:
- MABA 6511 - Experiential Learning (4.0 cr)

**Electives (4 credits)**

Select at least 4 credits from the following:
- ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
- ENTR 6036 - Managing the Growing Business (2.0 cr)
- FINA 6322 - Financial Modeling (2.0 cr)
- IDSC 6041 - Information Technology Management (2.0 cr)

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Information current as of November 07, 2022
IDSC 6051 - Information Technologies and Solutions (2.0 cr)
MBA 6031 - Financial Accounting (3.0 cr)
MBA 6111 - Leading Others (2.0 cr)
MBA 6211 - Marketing Management (3.0 cr)
MBA 6301 - Strategic Management (3.0 cr)
MGMT 6004 - Negotiation Strategies (2.0 cr)
MGMT 6032 - Strategic Alliances (2.0 cr)
MGMT 6033 - Strategy Implementation (2.0 cr)
MGMT 6084 - Management of Teams (2.0 cr)
MILI 6985 - The Health Care Marketplace (2.0 cr)
MKTG 6052 - Marketing Analytics: Managerial Decisions (2.0 cr)
MKTG 6084 - Persuasion and Influence (2.0 cr)
Twin Cities Campus

Asset Management Postbaccalaureate Certificate

Finance
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• Degree: Asset Management Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Minnesota has a broad and deep asset management community, ranging from large national firms to smaller boutique investment firms. Not all who serve this market seek a full graduate degree. The Asset Management certificate focuses on coursework focuses on the most relevant topics for those seeking to advance in their firms or pivot into asset management.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission: Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (6 credits)
Take the following courses:
MBA 6031 - Financial Accounting (3.0 cr)
MBA 6231 - Financial Management (3.0 cr)
Electives (6 credits)
Select 6 credits from the following:
- FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
- FINA 6321 - Portfolio Analysis and Management (2.0 cr)
- FINA 6324 - Securitization Markets (2.0 cr)
- FINA 6325 - Behavioral Finance (2.0 cr)
- FINA 6511 - Options for Corporate Finance (1.0 cr)
- FINA 6611 - Finance for Multinationals (1.0 cr)
Twin Cities Campus
Business Administration M.B.A.
Graduate Business Career Center
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
M.B.A. Programs Office, 1-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-625-5555)
Email: mba@umn.edu
Website: http://www.carlsonschool.umn.edu/MBA

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48 to 64
- This program does not require summer semesters for timely completion.
- Degree: Master of Business Administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

At the Carlson School, students tailor their education to meet their career objectives. Supported by outstanding faculty, cutting-edge coursework, and extensive networking opportunities, students compile an impressive record of professional achievements even before they graduate.

The Carlson School offers several pathways to the master of business administration degree: the full-time MBA, the part-time MBA, the online MBA, and the executive MBA. Dual degree programs are only available through the full-time MBA program. Please visit our website at http://www.carlsonschool.umn.edu/mba for more information.

The Carlson School's China Executive MBA program is offered through a partnership between the Carlson School and Lingnan (University) College of Sun Yat-sen University. The Carlson School's Vienna Executive MBA program is offered jointly with the Vienna University of Economics and Business (WU). For additional information on these two programs, please contact cgi@umn.edu.

Accreditation
This program is accredited by AACSB International.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

Special Application Requirements:
Applicants must have an acceptable score on the GMAT or GRE. In addition, international students must have an acceptable score on the Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS), or the Pearson Test of English Academic (PTE).

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 48 to 64 major credits and up to null credits outside the major. The final exam is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Joint- or Dual-degree Coursework: The Full-Time MBA program offers the following dual degree program options: MS-Applied Economics/MBA: up to 12 credits in common allowed; MS-Business Analytics/MBA: up to 12 credits in common allowed; MA-HRIR/MBA: up to 12 credits in common allowed; MHA/MBA: up to 12 credits in common allowed; MPP/MBA: up to 12 credits in common allowed; JD/MBA: up to 12 credits in common allowed; MD/MBA: up to 12 credits in common allowed; and PharmD/MBA: up to 12 credits in common allowed. For complete Dual Degree information, visit http://carlonschool.umn.edu/degrees/master-business-administration/dual-degrees

Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Full-Time Master of Business Administration

The Carlson full-time MBA program offers an intense curriculum that gives students a distinct edge. They start by taking coordinated core courses that provide a sound foundation in essential managerial disciplines, while at the same time, customizing their education to fit their career paths. The full-time program involves a rigorous time commitment. While the amount of time spent on campus varies from 30-50 hours per week, all students are expected to complete the degree in two years with a minimum of 64 credits.

Financial Accounting

Take 1 or more course(s) from the following:
- MBA 6031 - Financial Accounting (3.0 cr)

Data Analysis & Statistics

Take 1 or more course(s) from the following:
- MBA 6121 - Data Analysis and Statistics for Managers (3.0 cr)

Managerial Economics

Take 1 or more course(s) from the following:
- MBA 6141 - Managerial Economics (2.0 cr)

Marketing

Take 1 or more course(s) from the following:
- MBA 6211 - Marketing Management (3.0 cr)

Supply Chain & Operations

Take 1 or more course(s) from the following:
- MBA 6221 - Supply Chain & Operations (3.0 cr)

Financial Management

Take 1 or more course(s) from the following:
- MBA 6231 - Financial Management (3.0 cr)

IT Management

Take 1 or more course(s) from the following:
- MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)

Strategic Management

Take 1 or more course(s) from the following:
- MBA 6301 - Strategic Management (3.0 cr)

Business Ethics

Take 1 or more course(s) from the following:
- MBA 6315 - The Ethical Environment of Business (2.0 cr)

Leadership Requirement

The total leadership credit requirement is 4 credits. MBA 6110 is completed in spring of the first year for a total of 2 credits. Additionally, students must complete MGMT 6465 for 2 credits prior to degree completion. Take exactly 2 course(s) totaling exactly 4 credit(s) from the following:
- MBA 6111 - Leading Others (2.0 cr)
- MGMT 6465 - Leadership and Personal Development (2.0 cr)

Internship Requirement

MBA students are required to complete work experience during the program. Students will be enrolled in a zero-credit course during their first spring semester prior to work experience during the summer.
MBA 6999 - Full Time MBA Internship Course (0.0 cr)

Enterprise Requirement
All full-time MBA students are required to participate in one Enterprise program throughout their time in the program.
Take exactly 8 credit(s) from the following:
• MBA 6501 - Carlson Funds Enterprise: Growth (1.0 - 4.0 cr)
• MBA 6502 - Carlson Funds Enterprise: Fixed Income (1.0 - 4.0 cr)
• MBA 6503 - Carlson Ventures Enterprise (2.0 - 4.0 cr)
• MBA 6504 - Carlson Consulting Enterprise (1.0 - 4.0 cr)
• MBA 6505 - Carlson Brand Enterprise (2.0 - 4.0 cr)

International Experience
All MBA students must participate in an international study abroad program or complete a course that has been designated to meet this requirement. A minimum of 4 credits is required. If more are taken, remainder will count as elective credit(s).
Take 1 or more course(s) totaling 4 or more credit(s) from the following:
• IBUS 5xxx
• IBUS 6xxx
• IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
• MGMT 6305 - The International Environment of Business (4.0 cr)
• MILI 6997 - MILI Global Valuation Lab (4.0 cr)
• MKTG 6072 - International Marketing (4.0 cr)
• SCO 6081 - Global Operations Strategy (4.0 cr)

MBA Electives
Electives not on this list must be approved by MBA Programs Office in order to count for degree requirements.
Take 24 or more credit(s) from the following:
• ACCT 5181 - Consolidations and Advanced Reporting (2.0 cr)
• ACCT 6102 - Financial Statement Analysis (2.0 cr)
• APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
• BLAW 6158 - The study of laws affecting private business and publicly-traded companies. (2.0 cr)
• ENTR 6021 - Developing New Ventures (2.0 cr)
• ENTR 6023 - Financing Business Ventures (2.0 cr)
• ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
• ENTR 6036 - Managing the Growing Business (2.0 cr)
• ENTR 6037 - Corporate Venturing (2.0 cr)
• ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
• ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
• FINA 5529 - Derivatives II (2.0 cr)
• FINA 6111 - Financing over a Firm's Lifecycle (1.0 cr)
• FINA 6112 - Private Equity (1.0 cr)
• FINA 6113 - Public Equity (1.0 cr)
• FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
• FINA 6122 - Financial Management of Depository Institutions (2.0 cr)
• FINA 6123 - Financial Services Industry (2.0 cr)
• FINA 6125 - Cryptocurrency, Blockchain, and Their Business Applications (2.0 cr)
• FINA 6211 - Cash Flows and Project Selection (1.0 cr)
• FINA 6212 - Working Capital Management (1.0 cr)
• FINA 6213 - Financial Capital Structure (1.0 cr)
• FINA 6214 - Business Valuation (1.0 cr)
• FINA 6215 - The CFO Mindset: Finance, Strategy and Operations (1.0 cr)
• FINA 6222 - Mergers and Acquisitions (2.0 cr)
• FINA 6241 - Corporate Financial Decisions and Analysis (4.0 cr)
• FINA 6242 - Advanced Corporate Finance Analysis and Decisions (4.0 cr)
• FINA 6321 - Portfolio Analysis and Management (2.0 cr)
• FINA 6322 - Financial Modeling (2.0 cr)
• FINA 6323 - Advanced Financial Modeling (2.0 cr)
• FINA 6324 - Securitization Markets (2.0 cr)
• FINA 6325 - Behavioral Finance (2.0 cr)
• FINA 6341 - World Economy (4.0 cr)
• FINA 6511 - Options for Corporate Finance (1.0 cr)
• FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
• FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
• FINA 6611 - Finance for Multinationals (1.0 cr)
• FINA 6621 - International Financial Management (2.0 cr)
• FINA 6623 - Economic Booms and Busts: Understanding Government Interventions (2.0 cr)
• FINA 6624 - Growth in the Global Economy (2.0 cr)
• FINA 6801 - Finance Independent Study (1.0 - 6.0 cr)
• HRIR 6112 - People Analytics (2.0 cr)
• IDSC 6051 - Information Technologies and Solutions (2.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credit Hours</th>
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<td>IDSC 6442</td>
<td>E-Sourcing and E-Auctions</td>
<td>2.0 cr</td>
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<tr>
<td>IDSC 6444</td>
<td>Business Analytics for Managers I</td>
<td>2.0 cr</td>
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<tr>
<td>IDSC 6446</td>
<td>Business Analytics for Managers II</td>
<td>2.0 cr</td>
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<tr>
<td>IDSC 6455</td>
<td>Web 2.0: The Business of Social Media</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>IDSC 6465</td>
<td>Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation</td>
<td>4.0 cr</td>
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</tbody>
</table>
Part-Time Master of Business Administration

The Carlson part-time MBA curriculum, which can be completed online, includes core courses that offer an in-depth study of the foundational and functional areas of business. Advanced electives, international study options, and specializations allow students to tailor a program that meets their long-term career goals. To graduate, students must earn 52 credits. Students may be waived as determined at the time of admission based on prior coursework and/or waiver exams taken prior to the end of the first semester of enrollment.

Strategic Management
Recommended to be taken in first semester of MBA program
- MBA 6301 - Strategic Management (3.0 cr)

Data Analysis & Statistics
- MBA 6121 - Data Analysis and Statistics for Managers (3.0 cr)

Financial Accounting
- MBA 6031 - Financial Accounting (3.0 cr)

Operations
- MBA 6221 - Supply Chain & Operations (3.0 cr)

Finance
- MBA 6231 - Financial Management (3.0 cr)

Marketing
- MBA 6211 - Marketing Management (3.0 cr)

Managerial Accounting
- MBA 6035 - Managerial Accounting (3.0 cr)

Leadership Requirement
- MBA 6111 - Leading Others (2.0 cr)

Business Ethics
- MBA 6315 - The Ethical Environment of Business (2.0 cr)

IT Requirement
Choose 1 of the following (if both taken, 1 will count as elective)
- IDSC 6041 - Information Technology Management (2.0 cr)
- IDSC 6051 - Information Technologies and Solutions (2.0 cr)

Economics Requirement
Choose 1 of the following. A minimum of 2 credits must be completed towards this requirement. If multiple courses are taken, additional will count towards electives.
- MBA 6141 - Managerial Economics (2.0 cr)
- FINA 6623 - Economic Booms and Busts: Understanding Government Interventions (2.0 cr)
- FINA 6624 - Growth in the Global Economy (2.0 cr)
- FINA 6341 - World Economy (4.0 cr)
International Experience
All MBA students must participate in an international study abroad program or complete a course that has been designated to meet this requirement. A minimum of 4 credits is required. If more are taken, remainder will count as elective credit(s).
Take 1 - 0 course(s) totaling exactly 4 credit(s) from the following:
- IBUS 5xxx
- IBUS 6xxx
- IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
- MGMT 6305 - The International Environment of Business (4.0 cr)
- MILI 6997 - MILI Global Valuation Lab (4.0 cr)
- MKTG 6072 - International Marketing (4.0 cr)
- SCO 6081 - Global Operations Strategy (4.0 cr)

Electives
Electives not on this list must be approved by MBA Programs Office to count towards degree requirements.
Take 19 or more credit(s) from the following:
- ACCT 5181 - Consolidations and Advanced Reporting (2.0 cr)
- ACCT 5102 - Financial Statement Analysis (2.0 cr)
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- BLAW 6158 - The study of laws affecting private business and publicly-traded companies. (2.0 cr)
- ENTR 6021 - Developing New Ventures (2.0 cr)
- ENTR 6023 - Financing Business Ventures (2.0 cr)
- ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
- ENTR 6036 - Managing the Growing Business (2.0 cr)
- ENTR 6037 - Corporate Venturing (2.0 cr)
- ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
- ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
- FINA 5529 - Derivatives II (2.0 cr)
- FINA 6111 - Financing over a Firm's Lifecycle (1.0 cr)
- FINA 6112 - Private Equity (1.0 cr)
- FINA 6113 - Public Equity (1.0 cr)
- FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
- FINA 6122 - Financial Management of Depositary Institutions (2.0 cr)
- FINA 6123 - Financial Services Industry (2.0 cr)
- FINA 6125 - Cryptocurrency, Blockchain, and Their Business Applications (2.0 cr)
- FINA 6211 - Cash Flows and Project Selection (1.0 cr)
- FINA 6212 - Working Capital Management (1.0 cr)
- FINA 6213 - Financial Capital Structure (1.0 cr)
- FINA 6214 - Business Valuation (1.0 cr)
- FINA 6215 - The CFO Mindset: Finance, Strategy and Operations (1.0 cr)
- FINA 6222 - Mergers and Acquisitions (2.0 cr)
- FINA 6241 - Corporate Financial Decisions and Analysis (4.0 cr)
- FINA 6242 - Advanced Corporate Finance Analysis and Decisions (4.0 cr)
- FINA 6321 - Portfolio Analysis and Management (2.0 cr)
- FINA 6322 - Financial Modeling (2.0 cr)
- FINA 6323 - Advanced Financial Modeling (2.0 cr)
- FINA 6324 - Securitization Markets (2.0 cr)
- FINA 6325 - Behavioral Finance (2.0 cr)
- FINA 6341 - World Economy (4.0 cr)
- FINA 6511 - Options for Corporate Finance (1.0 cr)
- FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
- FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
- FINA 6611 - Finance for Multinationals (1.0 cr)
- FINA 6621 - International Financial Management (2.0 cr)
- FINA 6623 - Economic Booms and Busts: Understanding Government Interventions (2.0 cr)
- FINA 6624 - Growth in the Global Economy (2.0 cr)
- FINA 6801 - Finance Independent Study (1.0 - 6.0 cr)
- HRIR 6112 - People Analytics (2.0 cr)
- IDSC 6041 - Information Technology Management (2.0 cr)
- IDSC 6051 - Information Technologies and Solutions (2.0 cr)
- IDSC 6423 - Enterprise Systems (2.0 cr)
- IDSC 6442 - E-Sourcing and E-Auctions (2.0 cr)
- IDSC 6444 - Business Analytics for Managers I (2.0 cr)
- IDSC 6446 - Business Analytics for Managers II (2.0 cr)
- IDSC 6455 - Web 2.0: The Business of Social Media (2.0 cr)
- IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
- IDSC 6471 - Knowledge Management (2.0 cr)
- IDSC 6481 - Managerial Decision Making (2.0 cr)
• INS 6101 - Employee Benefits (2.0 cr)
• INS 6105 - Corporate Risk Management (2.0 cr)
• INS 6200 - Insurance Theory and Practice (2.0 cr)
• MBA 6403 - Strategic Change in the Energy Industry (2.0 cr)
• MBA 6990 - MBA Topics (2.0 cr)
• MCOM 5500 - Enhancing Your Executive Image in Business Communications (2.0 cr)
• MCOM 5515 - Persuasive Writing in Business (2.0 cr)
• MCOM 5535 - Strategies and Skills for Managerial Presentations (2.0 cr)
• MGMT 5102 - StartUp: Customer Development and Testing (2.0 cr)
• MGMT 6004 - Negotiation Strategies (2.0 cr)
• MGMT 6031 - Industry Analysis and Competitive Strategy (4.0 cr)
• MGMT 6032 - Strategic Alliances (2.0 cr)
• MGMT 6033 - Strategy Implementation (2.0 cr)
• MGMT 6034 - Strategic Leadership (2.0 cr)
• MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
• MGMT 6041 - Competing Globally (2.0 cr)
• MGMT 6055 - Management of Innovation and Change (2.0 cr)
• MGMT 6071 - Strategic Management of Technological Change (2.0 cr)
• MGMT 6084 - Management of Teams (2.0 cr)
• MGMT 6085 - Corporate Strategy (4.0 cr)
• MGMT 6100 - Topics in Management (1.0 - 4.0 cr)
• MGMT 6305 - The International Environment of Business (4.0 cr)
• MGMT 6310 - Cross-Cultural Management: Developing Intercultural Competence (2.0 cr)
• MGMT 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
• MGMT 6411 - Corporate Responsibility (2.0 cr)
• MGMT 6465 - Leadership and Personal Development (2.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6421 - Healthcare Law: Strategic and Business Implications (2.0 cr)
• MILI 6562 - Information Technology in Health Care (2.0 cr)
• MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
• MILI 6920 - MILI Topic Course (2.0 cr)
• MILI 6963 - Healthcare Analytics (2.0 cr)
• MILI 6985 - The Health Care Marketplace (2.0 cr)
• MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
• MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
• MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
• MILI 6997 - MILI Global Valuation Lab (4.0 cr)
• MILI 6998 - MILI Fellows (0.0 - 2.0 cr)
• MILI 6999 - Independent Study (0.0 - 8.0 cr)
• MKTG 6051 - Marketing Research - Rapid Insights (2.0 cr)
• MKTG 6052 - Marketing Analytics: Managerial Decisions (2.0 cr)
• MKTG 6055 - Buyer Behavior (2.0 cr)
• MKTG 6062 - Marketing Channels (2.0 cr)
• MKTG 6072 - International Marketing (4.0 cr)
• MKTG 6073 - Marketing in High Tech Settings (2.0 cr)
• MKTG 6075 - Pricing Strategy (4.0 cr)
• MKTG 6078 - Advertising & Promotion (4.0 cr)
• MKTG 6082 - Brand Strategy (2.0 cr)
• MKTG 6083 - Customer Analytics (2.0 cr)
• MKTG 6084 - Persuasion and Influence (2.0 cr)
• MKTG 6085 - Nudge: Improving Decisions about Health, Wealth and Happiness (2.0 cr)
• MKTG 6086 - Digital Marketing (2.0 cr)
• MKTG 6087 - Power of Story (1.0 cr)
• MKTG 6088 - Strategic Marketing (3.0 cr)
• MKTG 6090 - Marketing Topics (1.0 - 4.0 cr)
• SCO 6041 - Project Management (2.0 cr)
• SCO 6045 - Strategic Sourcing (2.0 cr)
• SCO 6048 - Logistics and Transportation (2.0 cr)
• SCO 6051 - Service Management (2.0 cr)
• SCO 6056 - Managing Supply Chain Operations (4.0 cr)
• SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
• SCO 6081 - Global Operations Strategy (4.0 cr)
• SCO 6085 - Sales, Inventory, and Operations Planning (2.0 cr)
• SCO 6091 - Process Improvement Methods (2.0 cr)
• SCO 6092 - Supply Chain Risk and Security (2.0 cr)
• SCO 6094 - Responsible Supply Chain Management (2.0 cr)
• SCO 6095 - Supply Chain Management in the Food and Agribusiness Sector (2.0 cr)
• SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
• SCO 6097 - Supply Chain Management in the Retail Sector (2.0 cr)
• SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
• SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)
• SCO 6192 - Supply Chain Finance (2.0 cr)
• SCO 6850 - Topics in Operations and Management Science (2.0 - 4.0 cr)

Carlson Executive Master of Business Administration
The Carlson executive MBA is built on a foundation of time-tested business principles. By emphasizing a global perspective, the rigorous curriculum helps students develop a deeper understanding of theory and practice. Each class moves through the program together as a cohort, following set schedules. From orientation to graduation, it takes about 21 months to complete the program. Classes are held Fridays and Saturdays, predominantly on alternate weekends, 7:30 a.m. to 4:30 p.m., and do not meet during the summer.

CEMBA Program Requirements
The CEMBA program has a 52.5 credit program requirement.
CMBA 5839 - Management of Teams (1.5 cr)
CMBA 5838 - Financial Accounting (1.5 cr)
CMBA 5842 - Marketing Management (3.0 cr)
CMBA 5843 - Data Driven Decision Making (3.0 cr)
CMBA 5844 - Organizational Behavior (3.0 cr)
CMBA 5847 - Strategic Management (3.0 cr)
CMBA 5848 - Financial Management (3.0 cr)
CMBA 5849 - Supply Chain & Operations (3.0 cr)
CMBA 5851 - Economics (1.5 cr)
CMBA 5852 - Human Capital Management (1.5 cr)
CMBA 5853 - Negotiation Strategies: Creative Solutions for Difficult Problems (3.0 cr)
CMBA 5854 - Managerial Accounting (3.0 cr)
CMBA 5855 - Competing Globally (1.5 cr)
CMBA 5856 - Ethics & Corporate Responsibility (1.5 cr)
CMBA 5857 - Corporate Strategy (3.0 cr)
CMBA 5861 - Customer Centric Marketing (3.0 cr)
CMBA 5862 - Competing in the Digital Age (1.5 cr)
CMBA 5863 - Entrepreneurship & Innovation (1.5 cr)
CMBA 5864 - Power & Influence (1.5 cr)
CMBA 5865 - Business Law (1.5 cr)
CMBA 5866 - International Residency (1.5 cr)
CMBA 5867 - International Residency: Global Team Project (1.5 cr)

Executive Leadership Insights
Students required to complete CMBA 5846 in each semester. Will complete 0.5 credits in fall year 1, 0.5 credits in spring year 1, 1.5 credits in fall year 2, and 0.5 credits in spring year 2.
Take exactly 3 credit(s) from the following:
• CMBA 5846 - Executive Leadership Insights (0.5 - 3.0 cr)

Top Management Perspectives
Students required to complete CMBA 5845 in each semester. Will complete 0 credits in fall year 1, 0 credits in spring year 1, 0 credits in fall year 2, and 1.5 credits in spring year 2.
CMBA 5845 - Executive Perspectives (0.0 - 1.5 cr)

China Executive M.B.A.
Offered through a partnership between the Carlson School and Lingnan College of Sun Yat-sen University, the Executive MBA - China program examines senior management practices in the context of a global economy with increasing technological, political, and social changes. Along with a rigorous curriculum, the program gives business leaders opportunities to work with a diverse group of peers and top international faculty committed to cutting-edge research. The program takes place primarily in Guangzhou, China.

China Executive MBA Courses
51 credits required.
CHMB 5800 - Organizational Behavior (3.0 cr)
CHMB 5801 - Financial Accounting (3.0 cr)
CHMB 5802 - Statistics and Decision Making (3.0 cr)
CHMB 5803 - Operations Management (3.0 cr)
CHMB 5804 - Managerial Accounting (3.0 cr)
CHMB 5805 - Financial Management (3.0 cr)
CHMB 5806 - Marketing Management (3.0 cr)
CHMB 5807 - Business Strategy (3.0 cr)

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CHMB 5808 - Strategic Marketing (3.0 cr)
CHMB 5809 - Advanced Financial Management (3.0 cr)
CHMB 5810 - International Environment (1.5 cr)
CHMB 5811 - Information Technology Management (3.0 cr)
CHMB 5813 - Ethics and Leadership (3.0 cr)
CHMB 5815 - International Human Resources Management (3.0 cr)
CHMB 5816 - International Residency (6.0 cr)
CHMB 5817 - China's Economy (1.5 cr)
CHMB 5818 - Law and Business (3.0 cr)

Vienna Masters of Business Administration

Vienna MBA Coursework Requirements
58 credits required
VMBA 5700 - Managerial Accounting (4.0 cr)
VMBA 5701 - Data Analysis and Decision Making (4.0 cr)
VMBA 5702 - Financial Management (4.0 cr)
VMBA 5703 - Marketing Management (4.0 cr)
VMBA 5704 - Managing People and Organizations (4.0 cr)
VMBA 5705 - Operations Management (4.0 cr)
VMBA 5706 - Business, Government, and Macroeconomics (4.0 cr)
VMBA 5707 - Economics in Transition (4.0 cr)
VMBA 5709 - Info Tech Mgmt (4.0 cr)
VMBA 5711 - Managing Globalization (Guangzhou) (4.0 cr)
VMBA 5712 - Strategies for a Global Company: an Integrative Perspective (6.0 cr)
VMBA 5713 - Negotiations and Conflict Management (4.0 cr)
VMBA 5714 - Financial Accounting (4.0 cr)
VMBA 5715 - Corporate and Entrepreneurial Strategy (4.0 cr)

India

Online Master of Business Administration
The online MBA is a 2-3 year, 52-credit, fully online program designed for working professionals to obtain the fundamental business knowledge crucial for leading careers in a complex, rapidly evolving business environment. Courses are taught by our nationally renowned expert faculty and executive-level professionals.

Online MBA students will be required to complete at least one in-person residency.

Strategic Management
MBA 6301 - Strategic Management (3.0 cr)
Financial Accounting
MBA 6031 - Financial Accounting (3.0 cr)
Financial Management
MBA 6231 - Financial Management (3.0 cr)
Data Analysis & Statistics
MBA 6121 - Data Analysis and Statistics for Managers (3.0 cr)
Supply Chain & Operations
MBA 6221 - Supply Chain & Operations (3.0 cr)
Economics
MBA 6141 - Managerial Economics (2.0 cr)
Organizational Behavior
MBA 6111 - Leading Others (2.0 cr)
Marketing
MBA 6211 - Marketing Management (3.0 cr)
Business Ethics
MBA 6315 - The Ethical Environment of Business (2.0 cr)
Information Technology Management
MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)
International Experience
All MBA students must participate in an international study abroad program or complete a course that has been designated to meet this requirement. A minimum of 4 credits is required. If more are taken, remainder will count as elective credit(s).
Take exactly 4 credit(s) from the following:
•IBUS 5xxx
•IBUS 6xxx
•IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovatio (4.0 cr)

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Information current as of November 07, 2022
• MGMT 6305 - The International Environment of Business (4.0 cr)
• MILI 6997 - MILI Global Valuation Lab (4.0 cr)
• MKTG 6072 - International Marketing (4.0 cr)
• SCO 6081 - Global Operations Strategy (4.0 cr)

Electives
Electives not on this list must be approved by MBA Programs Office in order to count for degree requirements. Take 22 or more credit(s) from the following:

• ACCT 5181 - Consolidations and Advanced Reporting (2.0 cr)
• ACCT 6102 - Financial Statement Analysis (2.0 cr)
• APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
• BLAW 6158 - The study of laws affecting private business and publicly-traded companies. (2.0 cr)
• ENTR 6021 - Developing New Ventures (2.0 cr)
• ENTR 6023 - Financing Business Ventures (2.0 cr)
• ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
• ENTR 6036 - Managing the Growing Business (2.0 cr)
• ENTR 6037 - Corporate Venturing (2.0 cr)
• ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
• ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
• FINA 5529 - Derivatives II (2.0 cr)
• FINA 6111 - Financing over a Firm's Lifecycle (1.0 cr)
• FINA 6112 - Private Equity (1.0 cr)
• FINA 6113 - Public Equity (1.0 cr)
• FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
• FINA 6122 - Financial Management of Depository Institutions (2.0 cr)
• FINA 6123 - Financial Services Industry (2.0 cr)
• FINA 6125 - Cryptocurrency, Blockchain, and Their Business Applications (2.0 cr)
• FINA 6211 - Cash Flows and Project Selection (1.0 cr)
• FINA 6212 - Working Capital Management (1.0 cr)
• FINA 6213 - Financial Capital Structure (1.0 cr)
• FINA 6214 - Business Valuation (1.0 cr)
• FINA 6215 - The CFO Mindset: Finance, Strategy and Operations (1.0 cr)
• FINA 6222 - Mergers and Acquisitions (2.0 cr)
• FINA 6241 - Corporate Financial Decisions and Analysis (4.0 cr)
• FINA 6321 - Portfolio Analysis and Management (2.0 cr)
• FINA 6322 - Financial Modeling (2.0 cr)
• FINA 6323 - Advanced Financial Modeling (2.0 cr)
• FINA 6324 - Securitization Markets (2.0 cr)
• FINA 6325 - Behavioral Finance (2.0 cr)
• FINA 6341 - World Economy (4.0 cr)
• FINA 6511 - Options for Corporate Finance (1.0 cr)
• FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
• FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
• FINA 6611 - Finance for Multinationals (1.0 cr)
• FINA 6621 - International Financial Management (2.0 cr)
• FINA 6623 - Economic Booms and Busts: Understanding Government Interventions (2.0 cr)
• FINA 6624 - Growth in the Global Economy (2.0 cr)
• FINA 6801 - Finance Independent Study (1.0 - 6.0 cr)
• HRIR 6112 - People Analytics (2.0 cr)
• IDSC 6051 - Information Technologies and Solutions (2.0 cr)
• IDSC 6423 - Enterprise Systems (2.0 cr)
• IDSC 6442 - E-Sourcing and E-Auctions (2.0 cr)
• IDSC 6444 - Business Analytics for Managers I (2.0 cr)
• IDSC 6446 - Business Analytics for Managers II (2.0 cr)
• IDSC 6455 - Web 2.0: The Business of Social Media (2.0 cr)
• IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
• IDSC 6471 - Knowledge Management (2.0 cr)
• IDSC 6490 - Advanced Topics in MIS (2.0 cr)
• INS 6101 - Employee Benefits (2.0 cr)
• INS 6105 - Corporate Risk Management (2.0 cr)
• INS 6200 - Insurance Theory and Practice (2.0 cr)
• MBA 6035 - Managerial Accounting (3.0 cr)
• MBA 6403 - Strategic Change in the Energy Industry (2.0 cr)
• MBA 6990 - MBA Topics (2.0 cr)
• MCOM 5500 - Enhancing Your Executive Image in Business Communications (2.0 cr)
• MCOM 5515 - Persuasive Writing in Business (2.0 cr)
• MCOM 5535 - Strategies and Skills for Managerial Presentations (2.0 cr)
• MGMT 5102 - StartUp: Customer Development and Testing (2.0 cr)
• MGMT 6004 - Negotiation Strategies (2.0 cr)
• MGMT 6031 - Industry Analysis and Competitive Strategy (4.0 cr)
• MGMT 6032 - Strategic Alliances (2.0 cr)
• MGMT 6033 - Strategic Leadership (2.0 cr)
• MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
• MGMT 6041 - Competing Globally (2.0 cr)
• MGMT 6055 - Management of Innovation and Change (2.0 cr)
• MGMT 6071 - Strategic Management of Technological Change (2.0 cr)
• MGMT 6084 - Management of Teams (2.0 cr)
• MGMT 6085 - Corporate Strategy (4.0 cr)
• MGMT 6100 - Topics in Management (1.0 - 4.0 cr)
• MGMT 6305 - The International Environment of Business (4.0 cr)
• MGMT 6310 - Cross-Cultural Management: Developing Intercultural Competence (2.0 cr)
• MGMT 6602 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
• MGMT 6411 - Corporate Responsibility (2.0 cr)
• MGMT 6465 - Leadership and Personal Development (2.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6421 - Healthcare Law: Strategic and Business Implications (2.0 cr)
• MILI 6562 - Information Technology in Health Care (2.0 cr)
• MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
• MILI 6920 - MILI Topic Course (2.0 cr)
• MILI 6963 - Healthcare Analytics (2.0 cr)
• MILI 6985 - The Health Care Marketplace (2.0 cr)
• MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
• MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
• MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
• MILI 6997 - MILI Global Valuation Lab (4.0 cr)
• MILI 6998 - MILI Fellows (0.0 - 2.0 cr)
• MILI 6999 - Independent Study (0.0 - 8.0 cr)
• MKTG 6051 - Marketing Research - Rapid Insights (2.0 cr)
• MKTG 6052 - Marketing Analytics: Managerial Decisions (2.0 cr)
• MKTG 6055 - Buyer Behavior (2.0 cr)
• MKTG 6062 - Marketing Channels (2.0 cr)
• MKTG 6072 - International Marketing (4.0 cr)
• MKTG 6073 - Marketing in High Tech Settings (2.0 cr)
• MKTG 6075 - Pricing Strategy (4.0 cr)
• MKTG 6078 - Advertising & Promotion (4.0 cr)
• MKTG 6082 - Brand Strategy (2.0 cr)
• MKTG 6083 - Customer Analytics (2.0 cr)
• MKTG 6084 - Persuasion and Influence (2.0 cr)
• MKTG 6085 - Nudge: Improving Decisions about Health, Wealth and Happiness (2.0 cr)
• MKTG 6086 - Digital Marketing (2.0 cr)
• MKTG 6087 - Power of Story (1.0 cr)
• MKTG 6088 - Strategic Marketing (3.0 cr)
• MKTG 6090 - Marketing Topics (1.0 - 4.0 cr)
• SCO 6041 - Project Management (2.0 cr)
• SCO 6045 - Strategic Sourcing (2.0 cr)
• SCO 6048 - Logistics and Transportation (2.0 cr)
• SCO 6051 - Service Management (2.0 cr)
• SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
• SCO 6081 - Global Operations Strategy (4.0 cr)
• SCO 6085 - Sales, Inventory, and Operations Planning (2.0 cr)
• SCO 6091 - Process Improvement Methods (2.0 cr)
• SCO 6092 - Supply Chain Risk and Security (2.0 cr)
• SCO 6094 - Responsible Supply Chain Management (2.0 cr)
• SCO 6095 - Supply Chain Management in the Food and Agribusiness Sector (2.0 cr)
• SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
• SCO 6097 - Supply Chain Management in the Retail Sector (2.0 cr)
• SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
• SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)
• SCO 6192 - Supply Chain Finance (2.0 cr)
• SCO 6850 - Topics in Operations and Management Science (2.0 - 4.0 cr)
Global Medical Industry M.B.A.
The Carlson Global Medical Industry MBA is designed to train multi-professional business leaders around the world to shape the future of the medical industry and drive innovation in financing, technology and care solutions. The curriculum integrates rich practical experiences in data analytics, medical technology, technological innovation, global financing, business operations and management, marketing, strategy, and promotion of the world's sustainable development all with a uniquely global perspective. The program features a capstone course, Global Medical Innovation Laboratory, offering curriculum and experiential learning with partner universities on multiple continents as an immersive critical student thinking process to accelerate affordable new service and technology solutions around the world. Since first offered to domestic MBA students in 2014, the Laboratory has won multiple awards for innovation in MBA and business school curriculum. The lab is a mix of class sessions, research, virtual site visits, and group work. This lab is geared to provide participants with an opportunity to work in cross-cultural teams on a valuation project.

Global Medical Industry MBA Courses
Take the following courses:
IDSC 6051 - Information Technologies and Solutions (2.0 cr)
MBA 6031 - Financial Accounting (3.0 cr)
MBA 6035 - Managerial Accounting (3.0 cr)
MBA 6111 - Leading Others (2.0 cr)
MBA 6121 - Data Analysis and Statistics for Managers (3.0 cr)
MBA 6141 - Managerial Economics (2.0 cr)
MBA 6211 - Marketing Management (3.0 cr)
MBA 6221 - Supply Chain & Operations (3.0 cr)
MBA 6231 - Financial Management (3.0 cr)
MBA 6301 - Strategic Management (3.0 cr)
MBA 6315 - The Ethical Environment of Business (2.0 cr)
MIMB 6883 - The Global Healthcare Marketplace (2.0 cr)
MIMB 6884 - Pharmaceutical Industry (2.0 cr)
MIMB 6885 - Information Technology in Health Care (2.0 cr)
MIMB 6886 - Medical Technology Evaluation and Market Research (2.0 cr)
MIMB 6887 - Medical Device Industry (2.0 cr)
MIMB 6888 - Research and Development of Medical Technology (2.0 cr)
MIMB 6889 - Health Law and Intellectual Property Strategy (2.0 cr)
MIMB 6890 - Data Driven Project Work (2.0 cr)
MIMB 6891 - Medical Industry Valuation Laboratory (4.0 cr)
Twin Cities Campus
Business Administration Minor
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
PhD Program in Business Administration, Carlson School of Management, Suite 4-205, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-0875 or 612-624-5065; fax 612-624-8221)
Email: csm-phd@umn.edu
Website: http://carlsonschool.umn.edu/degrees/phd

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 16
- Length of program in credits (Doctorate): 16
- This program does not require summer semesters for timely completion.
- None.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in business administration offers full-time advanced graduate education for students seeking academic placement at leading universities or research-oriented positions in business or government. The program is for individuals who have the intellectual capacity for advanced study, enjoy independent research and analytical thinking, and who wish to master a discipline within business administration.

Non-business administration doctoral students working toward a minor within the business administration program must complete a cohesive program of study in one of seven areas of specialization: accounting; finance; information and decision sciences; marketing; supply chain and operations; strategic management and entrepreneurship, and work and organizations.

Accreditation
This program is accredited by AACSB International

Program Delivery
This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
University of Minnesota PhD student in a field other than business administration.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

For each of the seven areas of concentration, a minimum of 16 credits is required. Coursework is selected in consultation with the PhD program office or the PhD coordinator of the student's chosen concentration area. Courses should be 8xxx-level, although up to 8 credits of 5xxx- and 7xxx-level coursework can be taken with the approval of the PhD and master's program offices.

Areas of Concentration

Accounting
Take 16 or more credit(s) from the following:

- ACCT 8801 - Topics in Empirical Research I (2.0 cr)
- ACCT 8802 - Topics in Empirical Research II (2.0 cr)
-ACCT 8803 - Topics in Empirical Research III (2.0 cr)
-ACCT 8811 - Topics in Information Economics I (2.0 cr)
-ACCT 8812 - Topics in Information Economics II (2.0 cr)
-ACCT 8813 - Topics in Information Economics III (2.0 cr)
-ACCT 8821 - Topics in Capital Markets I (2.0 cr)
-ACCT 8822 - Topics in Capital Markets II (2.0 cr)
-ACCT 8823 - Topics in Capital Markets III (2.0 cr)
-ACCT 8831 - Topics in Analytical Research I (2.0 cr)
-ACCT 8832 - Analytical Research Topics II (2.0 cr)
-ACCT 8833 - Topics in Analytical Research III (2.0 cr)

-OR-

Finance
Take 16 or more credit(s) from the following:
-FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
-FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
-FINA 8804 - Advanced Continuous Time Finance (2.0 cr)
-FINA 8810 - Topics in Asset Pricing (2.0 cr)
-FINA 8812 - Corporate Finance I (2.0 cr)
-FINA 8813 - Corporate Finance II (2.0 cr)
-FINA 8820 - Topics in Corporate Finance (2.0 cr)
-FINA 8822 - Empirical Methods in Finance (2.0 cr)
-FINA 8823 - Empirical Corporate Finance (2.0 cr)
-FINA 8890 - Seminar: Finance Topics (2.0 - 4.0 cr)

-OR-

Information and Decision Sciences
Take 16 or more credit(s) from the following:
-IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
-IDSC 8521 - System Development (3.0 cr)
-IDSC 8531 - Organizational Theory and Research in Information Systems (3.0 cr)
-IDSC 8541 - Introduction to Economics of Information Systems (3.0 cr)
-IDSC 8620 - Data Mining and Personalization (3.0 cr)
-IDSC 8630 - Social Media and Online Communities (2.0 cr)
-IDSC 8721 - Behavioral Decision Theory (3.0 cr)
-IDSC 8801 - Research Seminar in Information and Decision Sciences (2.0 cr)

-OR-

Marketing
Take 16 or more credit(s) from the following:
-MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
-MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
-MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
-MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
-MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
-MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)
-MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
-MKTG 8842 - Quantitative Modeling I (2.0 cr)
-MKTG 8843 - Empirical Quantitative Models (4.0 cr)
-MKTG 8851 - Seminar: Marketing Management and Strategy I (2.0 cr)
-MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
-MKTG 8890 - Seminar: Marketing Topics (1.0 - 4.0 cr)

-OR-

Strategic Management and Entrepreneurship
Take 16 or more credit(s) from the following:
-MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
-MGMT 8102 - Research Methods I - Applied Empirical Methods (2.0 cr)
-MGMT 8104 - PhD Seminar: Research Design (2.0 cr)
-MGMT 8202 - Seminar in International Management (2.0 cr)
-MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
-MGMT 8401 - Strategy I (2.0 cr)
-MGMT 8402 - Seminar in Behavioral Strategy (2.0 cr)
-MGMT 8403 - Strategy II (2.0 cr)
-MGMT 8404 - Seminar in Non-Market Strategy (2.0 cr)
• MGMT 8405 - Seminar in Technology Strategy (2.0 cr)
• MGMT 8501 - Seminar in Entrepreneurship (4.0 cr)

-OR-

Supply Chain and Operations
Take 16 or more credit(s) from the following:
• SCO 8800 - Research Topics in Supply Chain and Operations (1.0 - 2.0 cr)
• SCO 8811 - Operations Strategy (4.0 cr)
• SCO 8821 - Management of Technological Operations (4.0 cr)
• SCO 8822 - Innovative Operations (2.0 cr)
• SCO 8831 - Supply Chain Management (2.0 cr)
• SCO 8832 - Analytical Models for Operations Management (2.0 cr)
• SCO 8841 - Behavioral Research in Operations Management (4.0 cr)
• SCO 8842 - Retail Operations (2.0 cr)
• SCO 8843 - Sustainable and Socially-Responsible Operations (2.0 cr)
• SCO 8892 - Readings in Supply Chain and Operations (1.0 - 8.0 cr)
• SCO 8894 - Research in Supply Chain and Operations (1.0 - 8.0 cr)

-OR-

Work and Organizations
Take 16 or more credit(s) from the following:
• HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
• HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
• HRIR 8803 - Core Seminar: Fundamentals of HR Research (4.0 cr)
• HRIR 8820 - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
• HRIR 8825 - Research Practicum/Workshop (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Business Administration Ph.D.
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Carlson School of Management, Business Administration PhD Program, Suite 4-205, 321 19th Avenue South, Minneapolis, MN 55455
(612-624-0875; fax: 612-624-8221)
Email: csem-phd@umn.edu
Website: http://carlsonschool.umn.edu/degrees/phd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64 to 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Business Administration PhD program offers full-time advanced graduate education for students seeking academic placement at leading universities or research-oriented positions in business or government. The program is for individuals who have the intellectual capacity for advanced study, enjoy independent research and analytical thinking, and who wish to master a discipline within business administration.

Students choose to concentrate in one of seven areas of specialization: accounting; finance; information and decision sciences; marketing; supply chain and operations; strategic management and entrepreneurship; and work and organizations.

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have completed a four-year undergraduate degree in any relevant field of study.

Other requirements to be completed before admission:
Admission depends on the applicant's grades, test scores (GMAT or GRE), and strength of the letters of recommendation and the statement of purpose.

Preferred minimum test scores are 650 total on the GMAT or 320 total on the GRE general test.

Special Application Requirements:
Submit the following items via the University’s online application system: 1) complete application; 2) official copy of the GMAT or GRE scores taken within the last five years; 3) official TOEFL or IELTS scores (international applicants only) from a test taken within the last two years; 4) statement of purpose; 5) resume/CV; 6) three letters of recommendation; and 7) transcripts from all undergraduate and graduate institutions attended. The application deadline for all areas of concentration is December 15 each year for fall admission consideration. Applications are evaluated on a rolling basis beginning in mid-January. Admission decisions continue until available positions are filled.

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
  - Total score: 650
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Internet Based - Speaking Score: 25
- **IELTS**
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

## Program Requirements

24 to 28 credits are required in the major.

16 credits are required outside the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Coursework is selected in consultation with the advisor and varies across areas of concentration.

### Thesis Credits

Take 24 doctoral thesis credits.

**BA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**

### Areas of Concentration

**Accounting**

The accounting concentration requires 40 credits. Students pursue either an analytic or empirical research paradigm, in consultation with the advisor.

#### Required Coursework (24 credits)

Take the following courses:

- **ACCT 8801 - Topics in Empirical Research I (2.0 cr)**
- **ACCT 8802 - Topics in Empirical Research II (2.0 cr)**
- **ACCT 8803 - Topics in Empirical Research III (2.0 cr)**
- **ACCT 8811 - Topics in Information Economics I (2.0 cr)**
- **ACCT 8812 - Topics in Information Economics II (2.0 cr)**
- **ACCT 8813 - Topics in Information Economics III (2.0 cr)**
- **ACCT 8821 - Topics in Capital Markets I (2.0 cr)**
- **ACCT 8822 - Topics in Capital Markets II (2.0 cr)**
- **ACCT 8823 - Topics in Capital Markets III (2.0 cr)**
- **ACCT 8831 - Topics in Analytical Research I (2.0 cr)**
- **ACCT 8832 - Analytical Research Topics II (2.0 cr)**
- **ACCT 8833 - Topics in Analytical Research III (2.0 cr)**

#### Supporting/Methodology Coursework (16 credits)

Select 16 credits from the following in consultation with the advisor:

- **APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)**
- **APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)**
- **APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)**
- **APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)**
- **APEC 8211 - Econometric Analysis I (2.0 cr)**
- **APEC 8212 - Econometric Analysis II (2.0 cr)**
- **CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)**
- **ECON 8003 - Microeconomic Analysis (2.0 cr)**
- **ECON 8004 - Microeconomic Analysis (2.0 cr)**
ECON 8205 - Applied Econometrics (2.0 cr)
FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
FINA 8812 - Corporate Finance I (2.0 cr)
FINA 8813 - Corporate Finance II (2.0 cr)
FINA 8822 - Empirical Methods in Finance (2.0 cr)
FINA 8823 - Empirical Corporate Finance (2.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
STAT 6325 - Data Processing with PC-SAS (1.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
ACCT 8892 - Readings in Accounting (1.0 - 8.0 cr)
ACCT 8894 - Research in Accounting (1.0 - 8.0 cr)

-OR-

Finance
The 44-credit finance concentration provides a strong foundation in economic theory and empirical methods.

Required Coursework (20 credits)
Select 20 credits from the following, in consultation with the advisor. FINA 8810, 8820, and 8890 may be repeated with advisor approval.
FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
FINA 8804 - Advanced Continuous Time Finance (2.0 cr)
FINA 8810 - Topics in Asset Pricing (2.0 cr)
FINA 8812 - Corporate Finance I (2.0 cr)
FINA 8813 - Corporate Finance II (2.0 cr)
FINA 8820 - Topics in Corporate Finance (2.0 cr)
FINA 8822 - Empirical Methods in Finance (2.0 cr)
FINA 8823 - Empirical Corporate Finance (2.0 cr)
FINA 8890 - Seminar: Finance Topics (2.0 - 4.0 cr)

Additional Finance Courses (8 credits)
Take the following courses:
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)

Supporting/Methdology Coursework (16 credits)
Select 16 credits from the following in consultation with the advisor:
ACCT 8812 - Topics in Information Economics II (2.0 cr)
ACCT 8831 - Topics in Analytical Research I (2.0 cr)
ACCT 8832 - Analytical Research Topics II (2.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
ECON 8003 - Microeconomic Analysis (2.0 cr)
ECON 8004 - Microeconomic Analysis (2.0 cr)
ECON 8105 - Macroeconomic Theory (2.0 cr)
ECON 8106 - Macroeconomic Theory (2.0 cr)
ECON 8107 - Macroeconomic Theory (2.0 cr)
ECON 8108 - Macroeconomic Theory (2.0 cr)
ECON 8181 - Advanced Topics in Microeconomics (2.0 cr)
ECON 8182 - Advanced Topics in Microeconomics (2.0 cr)
ECON 8185 - Advanced Topics in Macroeconomics (2.0 cr)
ECON 8191 - Workshop in Mathematical Economics (1.0 cr)
ECON 8201 - Econometric Analysis (2.0 cr)
ECON 8205 - Applied Econometrics (2.0 cr)
ECON 8206 - Applied Econometrics (2.0 cr)
ECON 8207 - Applied Econometrics (2.0 cr)
ECON 8208 - Applied Econometrics (2.0 cr)
ECON 8211 - Econometrics (2.0 cr)
ECON 8212 - Econometrics (2.0 cr)
ECON 8501 - Wages and Employment (2.0 cr)
ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8701 - Monetary Economics (2.0 cr)
ECON 8702 - Monetary Economics (2.0 cr)
ECON 8704 - Financial Economics (2.0 cr)
ECON 8705 - Financial Economics (2.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
FINA 8892 - Independent Study in Finance (1.0 - 8.0 cr)
FINA 8894 - Directed Research in Finance (1.0 - 8.0 cr)

-OR-

Information and Decision Sciences

The information and decision sciences (IDSc) concentration requires 40 credits.

Required Coursework (15 credits)
Take the following courses:
IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
IDSC 8521 - System Development (3.0 cr)
IDSC 8531 - Organizational Theory and Research in Information Systems (3.0 cr)
IDSC 8541 - Introduction to Economics of Information Systems (3.0 cr)
IDSC 8721 - Behavioral Decision Theory (3.0 cr)

Additional IDSc Courses (2 credits)
Select at least 2 credits of the following in consultation with the advisor. IDSC 8801 may be repeated.
IDSC 8620 - Data Mining and Personalization (3.0 cr)
IDSC 8630 - Social Media and Online Communities (2.0 cr)
IDSC 8801 - Research Seminar in Information and Decision Sciences (2.0 cr)

Methodology Coursework (8 credits)
Take at least 8 credits in research methodology from the following:
APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
ECON 8581 - Advanced Topics in Labor Economics (2.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
JOUR 8500 - Seminar: Advanced Methods Special Topics (3.0 cr)
MABA 6441 - Causal Inference via Econometrics and Experimentation (2.0 cr)
MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
MKTG 8842 - Quantitative Modeling I (2.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5933 - Survey Methods: Designing Effective Questionnaires (2.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 5993 - Research Laboratory in Psychology (3.0 cr)
PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
STAT 8101 - Theory of Statistics I (3.0 cr)

Supporting/Methodology Coursework (15 credits)
Select 16 credits from the following in consultation with the advisor:
Take 16 or more credits from the following:
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- CSON 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- ECON 8581 - Advanced Topics in Labor Economics (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- HRIR 8820 - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
- IDSC 8892 - Readings in Information and Decision Sciences (1.0 - 8.0 cr)
- IDSC 8894 - Graduate Research in Information and Decision Sciences (1.0 - 8.0 cr)
- MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
- MGMT 8104 - PhD Seminar: Research Design (2.0 cr)
- MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
- MKTG 8842 - Quantitative Modeling I (2.0 cr)
- PA 8302 - Applied Policy Analysis (4.0 cr)
- PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5993 - Research Laboratory in Psychology (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8890 - Seminar: Marketing Topics (1.0 - 4.0 cr)
- STAT 8101 - Theory of Statistics 1 (3.0 cr)

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**Marketing**

The marketing concentration requires 40 credits. Students pursue either a consumer behavior focus or quantitative/marketing strategy focus.

**Consumer Behavior Focus (24 credits)**

Students pursuing the consumer behavior focus select 16 credits from the following list, plus 8 credits from the quantitative/marketing strategy course list, in consultation with the advisor. MKTG 8810 may be repeated.

- MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
- MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
- MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
- MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
- MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
- MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)

or **Quantitative/Marketing Strategy Focus (24 credits)**

Students pursuing the quantitative/marketing strategy focus select 14 credits from the following list, plus 10 credits from the consumer behavior course list, in consultation with the advisor. MKTG 8890 can be repeated.

- MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
- MKTG 8842 - Quantitative Modeling I (2.0 cr)
- MKTG 8843 - Empirical Quantitative Models (4.0 cr)
- MKTG 8851 - Seminar: Marketing Management and Strategy I (2.0 cr)
- MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
- MKTG 8890 - Seminar: Marketing Topics (1.0 - 4.0 cr)

**Supporting/Methodology Coursework (16 credits)**

Select 16 credits from the following in consultation with the advisor:

- ACCT 8811 - Topics in Information Economics I (2.0 cr)
- ACCT 8831 - Topics in Analytical Research I (2.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
ECON 8003 - Microeconomic Analysis (2.0 cr)
ECON 8004 - Microeconomic Analysis (2.0 cr)
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)
ECON 8118 - Noncooperative Game Theory (2.0 cr)
ECON 8119 - Cooperative Game Theory (2.0 cr)
ECON 8191 - Workshop in Mathematical Economics (1.0 cr)
ECON 8205 - Applied Econometrics (2.0 cr)
ECON 8206 - Applied Econometrics (2.0 cr)
ECON 8207 - Applied Econometrics (2.0 cr)
ECON 8208 - Applied Econometrics (2.0 cr)
ECON 8211 - Econometrics (2.0 cr)
ECON 8212 - Econometrics (2.0 cr)
ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5245 - Advanced Survey Data Analysis for Categorical and Rating Scale Data (1.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
IDSC 8721 - Behavioral Decision Theory (3.0 cr)
MKTG 8892 - Readings in Marketing (1.0 - 8.0 cr)
MKTG 8894 - Graduate Research in Marketing (1.0 - 8.0 cr)
MSBA 6441 - Causal Inference via Econometrics and Experimentation (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 8203 - Impression Management (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PSY 8935 - Readings in Behavioral Genetics and Individual Differences Psychology (1.0 cr)
PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)

Supply Chain and Operations
The supply chain and operations (SCO) concentration requires 42 credits.

Required Coursework (22 credits)
Take the following courses:
SCO 8811 - Operations Strategy (4.0 cr)
SCO 8821 - Management of Technological Operations (4.0 cr)
SCO 8822 - Innovative Operations (2.0 cr)
SCO 8831 - Supply Chain Management (2.0 cr)
SCO 8832 - Analytical Models for Operations Management (2.0 cr)
SCO 8841 - Behavioral Research in Operations Management (4.0 cr)
SCO 8842 - Retail Operations (2.0 cr)
SCO 8843 - Sustainable and Socially-Responsible Operations (2.0 cr)

Supporting Field/Methodology Coursework (14 credits)
Take the following courses:
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
APEC 8213 - Econometric Analysis III (2.0 cr)
APEC 8214 - Econometric Analysis IV (2.0 cr)
APEC 8215 - Theory of Statistics I (4.0 cr)
MKTG 8810 - PhD Seminar: Theory Building (2.0 cr)

Additional Supporting/Methodology Courses (6 credits)

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Information current as of November 07, 2022
Select at least 6 credits from the following:

APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
APEC 8602 - Economics of the Environment (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8254 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
MKTG 8842 - Quantitative Modeling I (2.0 cr)
MKTG 8843 - Empirical Quantitative Models (4.0 cr)
PA 5032 - Applied Regression (2.0 cr)
PA 5033 - Multivariate Techniques (2.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8311 - Linear Models (3.0 cr)

-OR-

Strategic Management and Entrepreneurship
The Strategic Management and Entrepreneurship (SME) concentration requires a minimum of 40 credits.

**Required Coursework (16 credits)**

Take the following courses:

CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
MGMT 8102 - Research Methods I - Applied Empirical Methods (2.0 cr)
MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
MGMT 8401 - Strategy I (2.0 cr)
MGMT 8403 - Strategy II (2.0 cr)
MGMT 8501 - Seminar in Entrepreneurship (4.0 cr)

**SME Elective Coursework (8 credits)**

Take at least 8 credits of SME electives from the list below:

MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
MGMT 8104 - PhD Seminar: Research Design (2.0 cr)
MGMT 8202 - Seminar in International Management (2.0 cr)
MGMT 8402 - Seminar in Behavioral Strategy (2.0 cr)
MGMT 8404 - Seminar in Non-Market Strategy (2.0 cr)
MGMT 8405 - Seminar in Technology Strategy (2.0 cr)

**Supporting/Methodology Coursework (16 credits)**

**Required Courses (7 credits)**

Take the following courses:

APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)

**Additional Supporting/Methodology Courses (9 credits)**

Select 9 credits from the following in consultation with the advisor:

APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
APEC 8213 - Econometric Analysis III (2.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
FINA 8823 - Empirical Corporate Finance (2.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MGMT 8892 - Readings in Management Theory and Administration (1.0 - 8.0 cr)
MGMT 8894 - Graduate Research in Management Theory and Administration (1.0 - 8.0 cr)
MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
POL 8106 - Quantitative Political Science I (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)
SOC 8735 - Sociology of Culture (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)

-OR-

Work and Organizations
The Work and Organizations (WOrg) concentration requires 44 credits. The multidisciplinary curriculum covers organizational behavior, human resource management, organizational economics and related areas.

Required WOrg Coursework (28 credits)
Take the following courses. HRIR 8820 must be taken 4 times for a total of 8 credits; HRIR must be taken 8825 4 times for a total of 4 credits.

HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
HRIR 8803 - Core Seminar: Fundamentals of HR Research (4.0 cr)
HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
HRIR 8820 - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
HRIR 8825 - Research Practicum/Workshop (1.0 cr)

Supporting/Methodology Coursework (16 credits)
Required Courses (6 credits)
Take the following courses:
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

Required APEC Courses (3 credits)
Select APEC 5031 (3 credits) or APEC 8211 and 8212 (total of 4 credits).
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)

Additional Supporting/Methodology Courses (7 credits)
Select 7 credits from the following in consultation with the advisor:
APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
APEC 8501 - Labor Economics I (2.0 cr)
APEC 8502 - Labor Economics II (2.0 cr)
CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
ECON 8205 - Applied Econometrics (2.0 cr)
ECON 8206 - Applied Econometrics (2.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
HRIR 8991 - Independent Study in Human Resources and Industrial Relations (1.0 - 8.0 cr)
MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
MGMT 8104 - PhD Seminar: Research Design (2.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)

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Information current as of November 07, 2022
PSY 8664 - Personality Assessment (3.0 cr)
PSY 8701 - Seminar in Industrial and Organizational Psychology I (3.0 cr)
PSY 8702 - Seminar in Industrial and Organizational Psychology II (3.0 cr)
PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
SOC 8590 - Topics in Life Course Sociology (3.0 cr)
Twin Cities Campus

Business Analytics M.S.
Information & Decision Sciences
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
MSBA Program
Carlson School of Management
University of Minnesota
321 19th Ave S, Suite 1-110
Minneapolis, MN 55455

Phone: 612-625-5555
Email: msba@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-science-in-business-analytics

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 45
• This program requires summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS in Business Analytics (MSBA) program provides a strong foundation in data analytics by bringing together a diverse body of knowledge from consumer behavior, risk management, operations research, optimization, information systems, computer science, applied statistics, and decision theory for the purpose of data-driven business decision making in both public and private sectors.

Students who graduate from this 45-credit program will have the deep quantitative capabilities and technical expertise to create business and social value by extracting useful insights and applying them in a variety of career settings. The Business Analytics MS can be completed in one year of full-time study or in two years part-time.

Accreditation
This program is accredited by AACSB International. The M.S. program in Business Analytics is STEM designated.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
- Demonstrated competency in computer programming in at least one of the following computer programming languages is required: Python, R, C, C++, C#, VB, Java, or PHP. Academic transcripts, certificates from online courses, or work experience may be cited to meet this requirement.
- At least one-semester college level calculus course is required.
- Work experience is not required, but preferred.

Special Application Requirements:
Applicants must submit all application materials through the University's admissions system. Application materials include:
- Online application & application fee.
- Transcripts from all colleges/universities previously attended. Non-English transcripts must be accompanied by an English translation.
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score. A GMAT/GRE waiver is available for qualified candidates.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (IELTS).
- Two letters of recommendations need to be submitted through the online application.
- A personal statement: submit essay responses to the three prompts below (2 pages maximum). Please answer each prompt as a separate short essay. (1) Why are you interested in studying at the Carlson School of Management at the University of Minnesota? What draws you to the Carlson School's MSBA program specifically? (approx. 200 words). (2) Briefly discuss your short- and long-term career goals. How will completing the MSBA program at this time help you toward achieving your goals? (approx. 275 words). (3) An aptitude for technical and quantitative work is necessary for success in the MSBA program. Please provide a specific example(s) from your past academic project, internship, or professional experience where you used a technical/quantitative tool or method to solve a problem. Please provide details describing the problem/situation; the actions you took; the specific tools, programming languages, and methods you used; and the results of your actions. (approx. 275 words)
- Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Applicants may choose to submit an essay to comment on any item(s) in their application they consider worthy of further explanation.
- Admissions interview (by invitation only).
- Video essay.

For admissions details, please visit https://carlsonschool.umn.edu/degrees/master-science-in-business-analytics/applying-admission

Applicants must submit their test score(s) from the following:

- GRE
- GMAT

International applicants must submit score(s) from one of the following tests:

- TOEFL
- IELTS

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 45 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** Students engage in an experiential learning application of the analytics methodologies, techniques, and tools learned throughout the program to a real-world problem. The final project consists of the development and presentation of results, interpretations, insights, and recommendations.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Some business/basic technical requirements can be waived for students with degrees in related business areas/computer science.

**Business/Management Fundamentals (13 credits)**

Take the following courses. Take MSBA 6355 for 1.5 credits.

- **MSBA 6111** - Business Essentials (3.0 cr)
- **MSBA 6121** - Introduction to Statistics for Data Scientists (3.0 cr)
- **MSBA 6131** - Introduction to Business Analytics in R (3.0 cr)
- **MSBA 6141** - Ethics and Data Privacy (1.0 cr)
- **MSBA 6345** - Consultative Problem-Solving & Agile Management for Analytics Projects (1.5 cr)
- **MSBA 6355** - Building and Managing Teams (0.5 cr)

**Elective (2 credits)**

Select at least 2 elective credits in consultation with the advisor.

- **APEC 5831** - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- **BLAW 6158** - The study of laws affecting private business and publicly-traded companies. (2.0 cr)
- **ENTR 6036** - Managing the Growing Business (2.0 cr)
- **FINA 6123** - Financial Services Industry (2.0 cr)
- **FINA 6325** - Behavioral Finance (2.0 cr)
- **IDSC 6003** - Accounting and Information Systems (2.0 cr)
- **IDSC 6041** - Information Technology Management (2.0 cr)
- **IDSC 6051** - Information Technologies and Solutions (2.0 cr)
- **IDSC 6423** - Enterprise Systems (2.0 cr)
- **INS 6105** - Corporate Risk Management (2.0 cr)
- **INS 6101** - Employee Benefits (2.0 cr)
INS 6200 - Insurance Theory and Practice (2.0 cr)
MBA 6111 - Leading Others (2.0 cr)
MBA 6141 - Managerial Economics (2.0 cr)
MBA 6235 - Managerial Accounting (2.0 cr)
MBA 6315 - The Ethical Environment of Business (2.0 cr)
MCOM 5515 - Persuasive Writing in Business (2.0 cr)
MCOM 5535 - Strategies and Skills for Managerial Presentations (2.0 cr)
MGT 6004 - Negotiation Strategies (2.0 cr)
MGT 6032 - Strategic Alliances (2.0 cr)
MGT 6033 - Strategy Implementation (2.0 cr)
MGT 6041 - Competing Globally (2.0 cr)
MGT 6055 - Management of Innovation and Change (2.0 cr)
MGT 6084 - Management of Teams (2.0 cr)
MGT 6310 - Cross-Cultural Management: Developing Intercultural Competence (2.0 cr)
MGT 6465 - Leadership and Personal Development (2.0 cr)
MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
MILI 6985 - The Health Care Marketplace (2.0 cr)
MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
MKTG 6052 - Marketing Analytics: Managerial Decisions (2.0 cr)
MKTG 6086 - Digital Marketing (2.0 cr)
MSBA 6461 - Advanced AI for Business Applications (2.0 cr)

Technical Fundamentals (9 credits)
Take the following courses:
MSBA 6311 - Programming for Data Science (3.0 cr)
MSBA 6321 - Data Management, Databases, and Data Warehousing (3.0 cr)
MSBA 6331 - Big Data Analytics (3.0 cr)

Specialty Courses (15 credits)
Take the following courses:
MSBA 6411 - Exploratory Data Analytics (3.0 cr)
MSBA 6421 - Predictive Analytics (3.0 cr)
MSBA 6431 - Advanced Issues in Business Analytics (3.0 cr)
MSBA 6441 - Causal Inference via Econometrics and Experimentation (3.0 cr)
MSBA 6451 - Optimization and Simulation for Decision Making (3.0 cr)

Capstone Experience (6 credits)
Take the following course:
MSBA 6511 - Business Analytics Experiential Learning (3.0 - 6.0 cr)

Joint- or Dual-degree Coursework: MS-Business Analytics/MBAMS-Business Analytics/MS-Finance
Student may take a total of 22 credits in common among the academic programs.
Twin Cities Campus
Business Analytics Postbaccalaureate Certificate
CSOM MS Business Analytics
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Business Analytics Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Business analytics and data science is one of the most sought after skill sets in modern industry. The Business Analytics certificate offers candidates the skills to extract insights with creative data analysis, and then apply the results in real business settings.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements: https://carlsonschool.umn.edu/degrees/graduate-certificates/admissions-requirements

Special Application Requirements:
- Demonstrated competency in computer programming in at least one of the following computer programming languages is required: Python, R, C, C++, C#, VB, Java, PHP, Pascal, or Fortran. Academic transcripts, certificates from online courses, or work experience may be cited to meet this requirement.
- At least one-semester college level math course (e.g. Calculus, Linear Algebra) is required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.
Required Coursework (12 credits)

Take the following courses:
- MABA 6121 - Practical Statistics for Business Applications (2.0 cr)
- MABA 6251 - AI for Competitive Advantage (2.0 cr)
- MABA 6311 - Programming for Business Analytics (2.0 cr)
- MABA 6321 - Data Management and Big Data (2.0 cr)
- MABA 6341 - Data Visualization (2.0 cr)
- MABA 6131 - Mathematics Essentials for Business Analytics (2.0 cr)
Twin Cities Campus
Business Management Minor
CSOM Financial Services Office
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
MBA & MS Programs Office
Carlson School of Management
321 19th Ave S Suite 1-110
Minneapolis, MN 55455
Email: mbasa@umn.edu
Website: https://carlsonschool.umn.edu/degrees/business-management-minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- Coursework is delivered through the Carlson School of Management via the following delivery methods: in-person courses on the Twin Cities campus, courses utilizing a hybrid of in-person meetings and online content delivery, or coursework delivered completely online.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The free-standing graduate-level minor in business management will enhance the preparation of graduate students to enter into organizations with a solid foundation of knowledge in key business disciplines. The business management minor program is flexible and designed to suit the particular needs and interests of the student through completion of a broad range of business core (foundation) and elective courses.

Note: Students enrolled in the master of business administration program or the business administration PhD program are not eligible for this minor.

Accreditation
This program is accredited by AACSB International

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Other requirements to be completed before admission:
Prior admission into an established master's or doctoral degree program at the University of Minnesota Twin Cities is required. Students must be in good academic standing within their own program to be admitted to the business minor. Students enrolled in the master of business administration program or the business administration PhD program are not eligible for this minor.

Students should first consult with their major program advisor about the advisability of a business minor and whether it is permitted by their program. They may then contact graduate program coordinator, Molly Bendzick (mollyb@umn.edu or (612) 625-7582) for more information on the minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
## Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

### Minor Coursework (8 - 12 credits)

Master's students select 8 credits and doctoral students select 12 credits from the following:

- **ACCT 5181** - Consolidations and Advanced Reporting (2.0 cr)
- **ACCT 6102** - Financial Statement Analysis (2.0 cr)
- **APEC 5831** - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- **BLAW 6158** - The study of laws affecting private business and publicly-traded companies. (2.0 cr)
- **ENTR 6021** - Developing New Ventures (2.0 cr)
- **ENTR 6023** - Financing Business Ventures (2.0 cr)
- **ENTR 6025** - Introduction to Entrepreneurship (2.0 cr)
- **ENTR 6036** - Managing the Growing Business (2.0 cr)
- **ENTR 6037** - Corporate Venturing (2.0 cr)
- **ENTR 6041** - Initiating New Product Design and Business Development (4.0 cr)
- **ENTR 6042** - Implementing New Product Design and Business Development (4.0 cr)
- **FINA 5529** - Derivatives II (2.0 cr)
- **FINA 6111** - Financing over a Firm’s Lifecycle (1.0 cr)
- **FINA 6112** - Private Equity (1.0 cr)
- **FINA 6113** - Public Equity (1.0 cr)
- **FINA 6121** - Debt Markets, Interest Rates, and Hedging (2.0 cr)
- **FINA 6122** - Financial Management of Depository Institutions (2.0 cr)
- **FINA 6123** - Financial Services Industry (2.0 cr)
- **FINA 6125** - Cryptocurrency, Blockchain, and Their Business Applications (2.0 cr)
- **FINA 6211** - Cash Flows and Project Selection (1.0 cr)
- **FINA 6212** - Working Capital Management (1.0 cr)
- **FINA 6213** - Financial Capital Structure (1.0 cr)
- **FINA 6214** - Business Valuation (1.0 cr)
- **FINA 6215** - The CFO Mindset: Finance, Strategy and Operations (1.0 cr)
- **FINA 6241** - Corporate Financial Decisions and Analysis (4.0 cr)
- **FINA 6242** - Advanced Corporate Finance Analysis and Decisions (4.0 cr)
- **FINA 6321** - Portfolio Analysis and Management (2.0 cr)
- **FINA 6322** - Financial Modeling (2.0 cr)
- **FINA 6323** - Advanced Financial Modeling (2.0 cr)
- **FINA 6324** - Securitization Markets (2.0 cr)
- **FINA 6325** - Behavioral Finance (2.0 cr)
- **FINA 6341** - World Economy (4.0 cr)
- **FINA 6511** - Options for Corporate Finance (1.0 cr)
- **FINA 6522** - Introduction to Derivatives and Financial Risk Management (2.0 cr)
- **FINA 6529** - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
- **FINA 6621** - International Financial Management (2.0 cr)
- **FINA 6623** - Economic Booms and Busts: Understanding Government Interventions (2.0 cr)
- **FINA 6624** - Growth in the Global Economy (2.0 cr)
- **FINA 6801** - Finance Independent Study (1.0 - 6.0 cr)
- **IDSC 6041** - Information Technology Management (2.0 cr)
- **IDSC 6051** - Information Technologies and Solutions (2.0 cr)
- **IDSC 6423** - Enterprise Systems (2.0 cr)
- **IDSC 6442** - E-Sourcing and E-Auctions (2.0 cr)
- **IDSC 6444** - Business Analytics for Managers I (2.0 cr)
- **IDSC 6446** - Business Analytics for Managers II (2.0 cr)
- **IDSC 6455** - Web 2.0: The Business of Social Media (2.0 cr)
- **IDSC 6465** - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
- **IDSC 6471** - Knowledge Management (2.0 cr)
- **IDSC 6481** - Managerial Decision Making (2.0 cr)
- **INS 6101** - Employee Benefits (2.0 cr)
- **INS 6105** - Corporate Risk Management (2.0 cr)
- **INS 6200** - Insurance Theory and Practice (2.0 cr)
- **MBA 6031** - Financial Accounting (3.0 cr)
- **MBA 6035** - Managerial Accounting (3.0 cr)
- **MBA 6111** - Leading Others (2.0 cr)
- **MBA 6121** - Data Analysis and Statistics for Managers (3.0 cr)
- **MBA 6141** - Managerial Economics (2.0 cr)
- **MBA 6211** - Marketing Management (3.0 cr)
- **MBA 6221** - Supply Chain & Operations (3.0 cr)
- **MBA 6231** - Financial Management (3.0 cr)
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<td>MBA 6301</td>
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<td>MBA 6403</td>
<td>Strategic Change in the Energy Industry (2.0 cr)</td>
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<td>MBA 6990</td>
<td>MBA Topics (2.0 cr)</td>
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<td>MCOM 5500</td>
<td>Enhancing Your Executive Image in Business Communications (2.0 cr)</td>
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<td>MCOM 5515</td>
<td>Persuasive Writing in Business (2.0 cr)</td>
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<td>MCOM 5535</td>
<td>Strategies and Skills for Managerial Presentations (2.0 cr)</td>
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<td>MGMT 5102</td>
<td>StartUp: Customer Development and Testing (2.0 cr)</td>
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<td>MGMT 6004</td>
<td>Negotiation Strategies (2.0 cr)</td>
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<td>MGMT 6031</td>
<td>Industry Analysis and Competitive Strategy (4.0 cr)</td>
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<td>MGMT 6033</td>
<td>Strategy Implementation (2.0 cr)</td>
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<td>Strategic Leadership (2.0 cr)</td>
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<td>MGMT 6035</td>
<td>Complex and Cross-Cultural Negotiations (2.0 cr)</td>
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<td>MGMT 6041</td>
<td>Competing Globally (2.0 cr)</td>
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<td>MGMT 6055</td>
<td>Management of Innovation and Change (2.0 cr)</td>
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<td>MGMT 6071</td>
<td>Strategic Management of Technological Change (2.0 cr)</td>
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<td>MGMT 6084</td>
<td>Management of Teams (2.0 cr)</td>
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<td>MGMT 6085</td>
<td>Corporate Strategy (4.0 cr)</td>
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<td>MGMT 6100</td>
<td>Topics in Management (1.0 - 4.0 cr)</td>
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<td>MGMT 6305</td>
<td>The International Environment of Business (4.0 cr)</td>
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<td>MGMT 6310</td>
<td>Cross-Cultural Management: Developing Intercultural Competence (2.0 cr)</td>
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<td>MGMT 6345</td>
<td>Powerful Problem Solving (2.0 cr)</td>
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<td>MGMT 6402</td>
<td>Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)</td>
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<td>MGMT 6411</td>
<td>Corporate Responsibility (2.0 cr)</td>
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<tr>
<td>MGMT 6465</td>
<td>Leadership and Personal Development (2.0 cr)</td>
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<td>MILI 6235</td>
<td>Pharmaceutical Industry: Business and Policy (2.0 cr)</td>
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<td>MILI 6421</td>
<td>Healthcare Law: Strategic and Business Implications (2.0 cr)</td>
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<td>MILI 6562</td>
<td>Information Technology in Health Care (2.0 cr)</td>
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<td>MILI 6589</td>
<td>Medical Technology Evaluation and Market Research (2.0 cr)</td>
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<td>MILI 6726</td>
<td>Medical Device Industry: Business and Public Policy (2.0 cr)</td>
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<td>MILI 6920</td>
<td>MILI Topic Course (2.0 cr)</td>
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<td>MILI 6963</td>
<td>Healthcare Analytics (2.0 cr)</td>
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<td>MILI 6985</td>
<td>The Health Care Marketplace (2.0 cr)</td>
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<td>MILI 6991</td>
<td>Anatomy and Physiology for Managers (2.0 cr)</td>
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<tr>
<td>MILI 6992</td>
<td>Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)</td>
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<td>MILI 6995</td>
<td>Medical Industry Valuation Laboratory (2.0 cr)</td>
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<td>MILI 6997</td>
<td>MILI Global Valuation Lab (4.0 cr)</td>
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<tr>
<td>MILI 6998</td>
<td>MILI Fellows (0.0 - 2.0 cr)</td>
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<tr>
<td>MILI 6999</td>
<td>Independent Study (0.0 - 8.0 cr)</td>
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<td>MKTG 6051</td>
<td>Marketing Research - Rapid Insights (2.0 cr)</td>
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<td>MKTG 6052</td>
<td>Marketing Analytics: Managerial Decisions (2.0 cr)</td>
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<td>MKTG 6055</td>
<td>Buyer Behavior (2.0 cr)</td>
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<td>MKTG 6062</td>
<td>Marketing Channels (2.0 cr)</td>
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<td>MKTG 6072</td>
<td>International Marketing (4.0 cr)</td>
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<td>MKTG 6073</td>
<td>Marketing in High Tech Settings (2.0 cr)</td>
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<td>MKTG 6075</td>
<td>Pricing Strategy (4.0 cr)</td>
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<td>MKTG 6078</td>
<td>Advertising &amp; Promotion (4.0 cr)</td>
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<td>MKTG 6082</td>
<td>Brand Strategy (2.0 cr)</td>
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<td>MKTG 6083</td>
<td>Customer Analytics (2.0 cr)</td>
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<tr>
<td>MKTG 6084</td>
<td>Persuasion and Influence (2.0 cr)</td>
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<tr>
<td>MKTG 6085</td>
<td>Nudge: Improving Decisions about Health, Wealth and Happiness (2.0 cr)</td>
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<tr>
<td>MKTG 6086</td>
<td>Digital Marketing (2.0 cr)</td>
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<tr>
<td>MKTG 6087</td>
<td>Power of Story (1.0 cr)</td>
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<td>MKTG 6088</td>
<td>Strategic Marketing (3.0 cr)</td>
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<td>MKTG 6090</td>
<td>Marketing Topics (1.0 - 4.0 cr)</td>
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<td>SCO 6041</td>
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<td>SCO 6045</td>
<td>Strategic Sourcing (2.0 cr)</td>
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<td>SCO 6048</td>
<td>Logistics and Transportation (2.0 cr)</td>
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<tr>
<td>SCO 6051</td>
<td>Service Management (2.0 cr)</td>
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<tr>
<td>SCO 6056</td>
<td>Managing Supply Chain Operations (4.0 cr)</td>
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<tr>
<td>SCO 6072</td>
<td>Managing Technologies in the Supply Chain (2.0 cr)</td>
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<tr>
<td>SCO 6081</td>
<td>Global Operations Strategy (4.0 cr)</td>
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<td>SCO 6085</td>
<td>Sales, Inventory, and Operations Planning (2.0 cr)</td>
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<td>SCO 6091</td>
<td>Process Improvement Methods (2.0 cr)</td>
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<td>SCO 6092</td>
<td>Supply Chain Risk and Security (2.0 cr)</td>
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<tr>
<td>SCO 6094</td>
<td>Responsible Supply Chain Management (2.0 cr)</td>
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</tbody>
</table>
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Business Research M.S.
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Business Administration PhD Program, Suite 4-205, 321-19th Avenue South, Minneapolis, MN  55455 (Phone: 612-624-0875; Fax: 612-624-8221)
Email: csom-phd@umn.edu
Website: https://carlsonschool.umn.edu/degrees/phd

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 40 to 44
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The business research MS is a terminal master's degree option restricted to eligible business administration PhD students who do not complete the doctoral degree. Applications to the business research MS are not otherwise considered.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must be current business administration PhD students who have completed all required core, concentration, and supporting coursework for the doctoral degree. The preliminary written examination must have been passed at the master's level, based on a set of criteria approved by the Carlson School PhD Committee comprising members from all seven areas of concentration.

Applicants must submit their test score(s) from the following:
• GRE
• GMAT
  - Total score: 650

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
• IELTS
  - Total Score: 7

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 24 to 28 major credits and 16 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.3 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Areas of Concentration
Students select one of seven areas of concentration. Concentration areas may require a first-year examination/presentation in addition to other program requirements.

Accounting (40 credits)
Students pursuing the accounting concentration must work under one of two accounting research paradigms: analytic or empirical.

Required Accounting Coursework (24 credits)
Take the following 24 credits:
- ACCT 8801 - Topics in Empirical Research I (2.0 cr)
- ACCT 8802 - Topics in Empirical Research II (2.0 cr)
- ACCT 8803 - Topics in Empirical Research III (2.0 cr)
- ACCT 8811 - Topics in Information Economics I (2.0 cr)
- ACCT 8812 - Topics in Information Economics II (2.0 cr)
- ACCT 8813 - Topics in Information Economics III (2.0 cr)
- ACCT 8821 - Topics in Capital Markets I (2.0 cr)
- ACCT 8822 - Topics in Capital Markets II (2.0 cr)
- ACCT 8823 - Topics in Capital Markets III (2.0 cr)
- ACCT 8831 - Topics in Analytical Research I (2.0 cr)
- ACCT 8832 - Analytical Research Topics II (2.0 cr)
- ACCT 8833 - Topics in Analytical Research III (2.0 cr)

Supporting/Methodology Coursework (16 credits)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.
- ACCT 8892 - Readings in Accounting (1.0 - 8.0 cr)
- ACCT 8894 - Research in Accounting (1.0 - 8.0 cr)
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- APEC 8211 - Econometric Analysis I (2.0 cr)
- APEC 8212 - Econometric Analysis II (2.0 cr)
- CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
- FINA 8812 - Corporate Finance I (2.0 cr)
- FINA 8813 - Corporate Finance II (2.0 cr)
- FINA 8822 - Empirical Methods in Finance (2.0 cr)
- FINA 8823 - Empirical Corporate Finance (2.0 cr)
- MATH 4603 - Advanced Calculus I (4.0 cr)
- MATH 4604 - Advanced Calculus II (4.0 cr)
- MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
- OR-

Finance (44 credits)
Finance is viewed as a subfield of economics. Students achieve a strong foundation in economic theory and empirical methods.

Required Finance Coursework (20 credits)
Take at least 20 credits from the following list. FINA 8810, 8820, and 8890 may be taken more than once.
- FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
- FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
- FINA 8804 - Advanced Continuous Time Finance (2.0 cr)
- FINA 8810 - Topics in Asset Pricing (2.0 cr)
- FINA 8812 - Corporate Finance I (2.0 cr)
- FINA 8813 - Corporate Finance II (2.0 cr)
- FINA 8820 - Topics in Corporate Finance (2.0 cr)
- FINA 8822 - Empirical Methods in Finance (2.0 cr)
- FINA 8823 - Empirical Corporate Finance (2.0 cr)
- FINA 8890 - Seminar: Finance Topics (2.0 - 4.0 cr)

Additional Required Finance Coursework (8 credits)
Take the following sequence of economics courses:

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<th>Course Title</th>
<th>Credits</th>
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<td>Microeconomic Theory</td>
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<td>Microeconomic Theory</td>
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<td>ECON 8104</td>
<td>Microeconomic Theory</td>
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</table>

Supporting/Methodology Coursework (16 credits)
Courses must be chosen in consultation with the advisor or PhD coordinator. Other courses may be selected with advisor or PhD coordinator approval.

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<tr>
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<th>Credits</th>
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<tr>
<td>ACCT 8812</td>
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<tr>
<td>ACCT 8831</td>
<td>Topics in Analytical Research I</td>
<td>2.0 cr</td>
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<td>ACCT 8832</td>
<td>Analytical Research Topics II</td>
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<td>APEC 8211</td>
<td>Econometric Analysis I</td>
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<td>ECON 8181</td>
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<td>ECON 8182</td>
<td>Advanced Topics in Microeconomics</td>
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<td>ECON 8185</td>
<td>Advanced Topics in Macroeconomics</td>
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<td>ECON 8191</td>
<td>Workshop in Mathematical Economics</td>
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<tr>
<td>ECON 8201</td>
<td>Econometric Analysis</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8205</td>
<td>Applied Econometrics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8206</td>
<td>Applied Econometrics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8207</td>
<td>Applied Econometrics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8208</td>
<td>Applied Econometrics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8211</td>
<td>Econometrics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8212</td>
<td>Econometrics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8501</td>
<td>Wages and Employment</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8601</td>
<td>Industrial Organization and Government Regulation</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8602</td>
<td>Industrial Organization and Government Regulation</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8701</td>
<td>Monetary Economics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8702</td>
<td>Monetary Economics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8704</td>
<td>Financial Economics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>ECON 8705</td>
<td>Financial Economics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>FINA 8892</td>
<td>Independent Study in Finance</td>
<td>1.0 - 8.0 cr</td>
</tr>
<tr>
<td>FINA 8894</td>
<td>Directed Research in Finance</td>
<td>1.0 - 8.0 cr</td>
</tr>
<tr>
<td>MATH 8601</td>
<td>Real Analysis</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

-OR-

Information and Decision Sciences (41 credits)

Required IDsc Coursework (15 credits)
Take all of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDSC 8511</td>
<td>Conceptual Topics and Research Methods in Information and Decision Sciences</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>IDSC 8521</td>
<td>System Development</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>IDSC 8531</td>
<td>Organizational Theory and Research in Information Systems</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>IDSC 8541</td>
<td>Introduction to Economics of Information Systems</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>IDSC 8721</td>
<td>Behavioral Decision Theory</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

Additional IDsc Required Coursework (2 credits)
Take a minimum of 2 credits from the following. 8801 may be repeated.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDSC 8620</td>
<td>Data Mining and Personalization</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>IDSC 8630</td>
<td>Social Media and Online Communities</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>IDSC 8801</td>
<td>Research Seminar in Information and Decision Sciences</td>
<td>2.0 cr</td>
</tr>
</tbody>
</table>

Methodology Coursework (8 credits)
Take at least 8 credits in research methodology from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APEC 8001</td>
<td>Applied Microeconomic Analysis of Consumer Choice and Consumer Demand</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>APEC 8002</td>
<td>Applied Microeconomic Analysis of Production and Choice Under Uncertainty</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>APEC 8003</td>
<td>Applied Microeconomic Analysis of Game Theory and Information</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>APEC 8206</td>
<td>Dynamic Optimization: Applications in Economics and Management</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>APEC 8211</td>
<td>Econometric Analysis I</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>APEC 8212</td>
<td>Econometric Analysis II</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>CI 8149</td>
<td>Qualitative Research: Coding, Analysis, Interpretation, and Writing</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>CSCI 5511</td>
<td>Artificial Intelligence I</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>CSCI 5512</td>
<td>Artificial Intelligence II</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
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<td>---------</td>
</tr>
<tr>
<td>CSCI 5521</td>
<td>Machine Learning Fundamentals</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>CSCI 5523</td>
<td>Introduction to Data Mining</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>CSCI 5551</td>
<td>Introduction to Intelligent Robotic Systems</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>CSOM 8101</td>
<td>Methods and Topics in Applied Economics</td>
<td>2.0 - 4.0 cr</td>
</tr>
<tr>
<td>ECON 8581</td>
<td>Advanced Topics in Labor Economics</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>EPSY 5244</td>
<td>Survey Design, Sampling, and Implementation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>EPSY 8252</td>
<td>Statistical Methods in Education II</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>EPSY 8264</td>
<td>Advanced Multiple Regression Analysis</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>EPSY 8267</td>
<td>Applied Multivariate Analysis</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>EPSY 8268</td>
<td>Hierarchical Linear Modeling in Educational Research</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>JOUR 8500</td>
<td>Seminar: Advanced Methods Special Topics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>MABA 6441</td>
<td>Causal Inference via Econometrics and Experimentation</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MKTG 8809</td>
<td>Consumer Behavior Research Methods</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>MKTG 8842</td>
<td>Quantitative Modeling I</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>OLPD 5056</td>
<td>Case Studies for Policy Research</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>OLPD 5061</td>
<td>Ethnographic Research Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 8302</td>
<td>Applied Policy Analysis</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PSY 5018H</td>
<td>Mathematical Models of Human Behavior</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PSY 5862</td>
<td>Psychological Measurement: Theory and Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PSY 5993</td>
<td>Research Laboratory in Psychology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6636</td>
<td>Qualitative Research Methods in Public Health Practice</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6810</td>
<td>Survey Research Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6815</td>
<td>Community-based Participatory Research</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 7430</td>
<td>Statistical Methods for Correlated Data</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 7440</td>
<td>Introduction to Bayesian Analysis</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 8432</td>
<td>Probability Models for Biostatistics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 8442</td>
<td>Bayesian Decision Theory and Data Analysis</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 8804</td>
<td>Advanced Quantitative Methods Seminar</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>SOC 8412</td>
<td>Social Network Analysis: Theory and Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>SOC 8811</td>
<td>Advanced Social Statistics</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 8101</td>
<td>Theory of Statistics 1</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Supporting Field Coursework (16 credits)**

Courses must be chosen in consultation with the advisor or PhD coordinator. Take 16 or more credit(s) from the following:

- **APEC 8001** - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- **APEC 8002** - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- **APEC 8003** - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- **APEC 8206** - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- **APEC 8211** - Econometric Analysis I (2.0 cr)
- **APEC 8212** - Econometric Analysis II (2.0 cr)
- **CSCI 5125** - Collaborative and Social Computing (3.0 cr)
- **CSCI 5980** - Special Topics in Computer Science (1.0 - 3.0 cr)
- **CSCI 8551** - Intelligent Agents (3.0 cr)
- **CSCI 9980** - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- **CSOM 8101** - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- **ECON 8581** - Advanced Topics in Labor Economics (2.0 cr)
- **ECON 8601** - Industrial Organization and Government Regulation (2.0 cr)
- **ECON 8602** - Industrial Organization and Government Regulation (2.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)
- **EPSY 8264** - Advanced Multiple Regression Analysis (3.0 cr)
- **EPSY 8267** - Applied Multivariate Analysis (3.0 cr)
- **EPSY 8268** - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- **HRIR 8820** - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
- **IDSC 8892** - Readings in Information and Decision Sciences (1.0 - 8.0 cr)
- **IDSC 8894** - Graduate Research in Information and Decision Sciences (1.0 - 8.0 cr)
- **MGMT 8101** - PhD Seminar: Theory Building (2.0 cr)
- **MGMT 8104** - PhD Seminar: Research Design (2.0 cr)
- **MGMT 8302** - Seminar in Organizational Theory (4.0 cr)
- **MKTG 8842** - Quantitative Modeling I (2.0 cr)
- **PA 8302** - Applied Policy Analysis (4.0 cr)
- **PSY 5018H** - Mathematical Models of Human Behavior (3.0 cr)
- **PSY 5862** - Psychological Measurement: Theory and Methods (3.0 cr)
- **PSY 5993** - Research Laboratory in Psychology (3.0 cr)
- **PSY 8201** - Social Cognition (3.0 cr)
- **PSY 8960** - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- **PUBH 7430** - Statistical Methods for Correlated Data (3.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
• PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
• PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• STAT 8101 - Theory of Statistics I (3.0 cr)

-OR-

Marketing (40 credits)

Students pursuing the marketing concentration choose one of two focus areas: consumer behavior or quantitative/marketing strategy.

Consumer Behavior Concentration (24 credits)

Take at least 16 credits of consumer behavior seminars from the list below. Mktg 8810 can be repeated. In addition, take at least 8 credits from the quantitative/marketing strategy concentration course list.

Take 16 or more credit(s) from the following:
- MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
- MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
- MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
- MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
- MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
- MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)

or Quantitative/Marketing Strategy Concentration (24 credits)

Take at least 14 credits of quantitative/marketing strategy seminars from the list below. Mktg 8890 can be repeated. In addition, take at least 10 credits from the consumer behavior concentration course list.

Take 14 or more credit(s) from the following:
- MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
- MKTG 8842 - Quantitative Modeling I (2.0 cr)
- MKTG 8843 - Empirical Quantitative Models (4.0 cr)
- MKTG 8851 - Seminar: Management Marketing and Strategy I (2.0 cr)
- MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
- MKTG 8890 - Seminar: Marketing Topics (1.0 - 4.0 cr)

Supporting/Methodology Coursework (16 credits)

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.

ACCT 8811 - Topics in Information Economics I (2.0 cr)
ACCT 8831 - Topics in Analytical Research I (2.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
ECON 8003 - Microeconomic Analysis (2.0 cr)
ECON 8004 - Microeconomic Analysis (2.0 cr)
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)
ECON 8118 - Noncooperative Game Theory (2.0 cr)
ECON 8119 - Cooperative Game Theory (2.0 cr)
ECON 8191 - Workshop in Mathematical Economics (1.0 cr)
ECON 8205 - Applied Econometrics (2.0 cr)
ECON 8206 - Applied Econometrics (2.0 cr)
ECON 8207 - Applied Econometrics (2.0 cr)
ECON 8208 - Applied Econometrics (2.0 cr)
ECON 8211 - Econometrics (2.0 cr)
ECON 8212 - Econometrics (2.0 cr)
ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5245 - Advanced Survey Data Analysis for Categorical and Rating Scale Data (1.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
IDSC 8721 - Behavioral Decision Theory (3.0 cr)
MKTG 8892 - Readings in Marketing (1.0 - 8.0 cr)
MKTG 8894 - Graduate Research in Marketing (1.0 - 8.0 cr)
MSBA 6441 - Causal Inference via Econometrics and Experimentation (3.0 cr)
PSY 5202 - Attitudes and Social Behavior (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
PSY 5207 - Personality and Social Behavior (3.0 cr)
PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
PSY 8203 - Impression Management (3.0 cr)
PSY 8208 - Social Psychology: The Self (3.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PSY 8935 - Readings in Behavioral Genetics and Individual Differences Psychology (1.0 cr)
PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)

Strategic Management and Entrepreneurship (40 credits)
Students focus on leadership, strategy, and entrepreneurship connecting the external worlds of competition and collaboration.
Required SME Coursework (16 credits)
Take the following courses:
CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
MGMT 8102 - Research Methods I - Applied Empirical Methods (2.0 cr)
MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
MGMT 8401 - Strategy I (2.0 cr)
MGMT 8403 - Strategy II (2.0 cr)
MGMT 8501 - Seminar in Entrepreneurship (4.0 cr)

SME Elective Coursework (8 credits)
Take at least 8 credits of SME electives from the list below.
MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
MGMT 8104 - PhD Seminar: Research Design (2.0 cr)
MGMT 8202 - Seminar in International Management (2.0 cr)
MGMT 8402 - Seminar in Behavioral Strategy (2.0 cr)
MGMT 8404 - Seminar in Non-Market Strategy (2.0 cr)
MGMT 8405 - Seminar in Technology Strategy (2.0 cr)

Supporting /Methodology Coursework (16 credits)
Take a minimum of 16 credits of supporting field/methodology coursework. APEC 8211 (2 cr), APEC 8212 (2 cr) and GRAD 8101 (3 cr) are required. Take an additional 9 credits minimum from the list below.
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)

Additional Supporting/Methodology Coursework (9 credits)
Take 9 or more credit(s) from the following:
• APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
• APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
• APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
• APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
• APEC 8213 - Econometric Analysis III (2.0 cr)
• CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• FINA 8823 - Empirical Corporate Finance (2.0 cr)
• HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MKTG 8892 - Readings in Management Theory and Administration (1.0 - 8.0 cr)
• MKTG 8894 - Graduate Research in Management Theory and Administration (1.0 - 8.0 cr)
• MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
• PA 8302 - Applied Policy Analysis (4.0 cr)
• POL 8106 - Quantitative Political Science I (3.0 cr)
• PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
• PUBH 8811 - Research Methods in Health Care (3.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
• SOC 8701 - Sociological Theory (4.0 cr)
• SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)
• SOC 8735 - Sociology of Culture (3.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)

-OR-

Supply Chain and Operations (42 credits)
Students complete coursework in the areas of operations and supply chain management.

Required SCO Coursework (22 credits)
Take the following courses:
SCO 8811 - Operations Strategy (4.0 cr)
SCO 8821 - Management of Technological Operations (4.0 cr)
SCO 8822 - Innovative Operations (2.0 cr)
SCO 8831 - Supply Chain Management (2.0 cr)
SCO 8832 - Analytical Models for Operations Management (2.0 cr)
SCO 8841 - Behavioral Research in Operations Management (4.0 cr)
SCO 8842 - Retail Operations (2.0 cr)
SCO 8843 - Sustainable and Socially-Responsible Operations (2.0 cr)

Supporting Field/Methodology Coursework (14 credits)
Take the following courses:
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
APEC 8213 - Econometric Analysis III (2.0 cr)
APEC 8214 - Econometric Analysis IV (2.0 cr)
MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)

Additional Supporting/Methodology Coursework (6 credits)
APEC 8208 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
APEC 8602 - Economics of the Environment (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
MKTG 8842 - Quantitative Modeling I (2.0 cr)
MKTG 8843 - Empirical Quantitative Models (4.0 cr)
PA 5032 - Applied Regression (2.0 cr)
PA 5033 - Multivariate Techniques (2.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5421 - Analysis of Categorical Data (3.0 cr)
STAT 5701 - Statistical Computing (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8311 - Linear Models (3.0 cr)

-OR-

Work and Organizations (44 credits)
Students complete multidisciplinary coursework covering organizational behavior, human resource management, organizational economics, personnel economics, labor relations, and related areas.

Required WOrg Coursework (28 credits)
Take HRIR 8820 4 times for a total of 8 credits. Take HRIR 8825 4 times for a total of 4 credits.
Take 28 or more credit(s) from the following:
• HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
• HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
• HRIR 8803 - Core Seminar: Fundamentals of HR Research (4.0 cr)
• HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
• HRIR 8820 - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
• HRIR 8825 - Research Practicum/Workshop (1.0 cr)

Supporting/Methodology Coursework (16 credits)
Take a minimum of 16 credits of supporting field/methodology coursework which must include: EPsy 8264 (3 cr); Psy 5862 (3 cr); APEC 5031 (3 cr) or, APEC 8211 and APEC 8212 (2 cr each); and 7 additional credits of supporting field coursework from the list below.

EPsy 8264 - Advanced Multiple Regression Analysis (3.0 cr)
Psy 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

Required Supporting/Methodology course (3 credits)
Take either APEC 5031 (3 cr) or, APEC 8211 and APEC 8212 (2 cr each).

Take 3 or more credit(s) from the following:
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 8211 - Econometric Analysis I (2.0 cr)
• APEC 8212 - Econometric Analysis II (2.0 cr)

Additional supporting/methodology coursework (7 credits)
Take 7 or more credit(s) from the following:
• APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
• APEC 8051 - Labor Economics I (2.0 cr)
• APEC 8502 - Labor Economics II (2.0 cr)
• CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
• ECON 8205 - Applied Econometrics (2.0 cr)
• ECON 8206 - Applied Econometrics (2.0 cr)
• EPsy 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPsy 5261 - Introductory Statistical Methods (3.0 cr)
• EPsy 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPsy 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPsy 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• HRIR 8991 - Independent Study in Human Resources and Industrial Relations (1.0 - 8.0 cr)
• MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
• MGMT 8104 - PhD Seminar: Research Design (2.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• PSY 8664 - Personality Assessment (3.0 cr)
• PSY 8701 - Seminar in Industrial and Organizational Psychology I (3.0 cr)
• PSY 8702 - Seminar in Industrial and Organizational Psychology II (3.0 cr)
• PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
• PUBH 6724 - The Health Care System and Public Health (3.0 cr)
• PUBH 6832 - Economics of the Health Care System (3.0 cr)
• SOC 8590 - Topics in Life Course Sociology (3.0 cr)
Twin Cities Campus
Business Taxation M.B.T.
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-7511; fax: 612-626-7795).
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/degrees/master-business-taxation

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Business Taxation

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

As one of the premier graduate tax programs in the nation, the Carlson School Master of Business Taxation (MBT) program helps students acquire a conceptual understanding of taxation, and develop technical competence in the practical application of the rules of taxation in business. In addition, courses in government and economic tax policy, tax negotiations, and tax technology and analytics provide breadth to complement the technical tax courses. Courses are also designed to develop a student's analytical, problem solving, writing and communication skills to enable them to more quickly advance their careers.

The program gives students a chance to learn from world-class faculty who are distinguished professionals with extensive real-life experience. The faculty have in-depth knowledge of the tax industry and work closely with the Twin Cities business community. Combining rigorous coursework and top faculty from the tax community brings a broad perspective into the relationship between tax and business issues, which helps prepare graduates for greater responsibilities in business management and consulting.

Historically, more than 80 percent of students are employed in the business community and take courses on a part-time basis. All courses are online. The MBTs online courses are asynchronous, divided into weekly modules. They are designed by online learning experts and employ the latest technologies. To free tax professionals from coursework responsibilities during the busiest part of tax season, no courses are offered during the spring semester from early March through April 15.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Required prerequisites
Introduction to Accounting
ACCT 2051 - Introduction to Accounting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

The following required prerequisite courses may be taken after being admitted to the MBT program, but must be taken before being eligible to take any MBT courses: ACCT 2051 and ACCT 5135. Equivalent courses may be substituted with approval of the director of graduate studies.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University’s admission system.

For international applicants, the results from one of the following English language tests are required: TOEFL, IELTS, MELAB. TOEFL scores must be received directly from TOEFL. IELTS and MELAB scores must be received directly from the testing center.

For additional application details, review the M.B.T. admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
**Plan C:** Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Courses (22 credits)**
Take the following courses:

- MBT 6201 - Tax Accounting Methods I (2.0 cr)
- MBT 6202 - Tax Accounting Methods II (2.0 cr)
- MBT 6221 - Tax Research, Communication, and Practice (4.0 cr)
- MBT 6231 - Corporate Taxation I (2.0 cr)
- MBT 6232 - Corporate Taxation II (2.0 cr)
- MBT 6341 - Taxation of Partners and Partnerships (2.0 cr)
- MBT 6347 - Tax Technology and Analytics Fundamentals (2.0 cr)
- MBT 6361 - State and Local Taxation (2.0 cr)
- MBT 6381 - Tax Aspects of International Business I (2.0 cr)
- MBT 6501 - Business, Government, and Economic Tax Policy (2.0 cr)

**Elective Courses (8 credits)**
Select 8 credits from the following list. Other courses may be applied to this requirement with prior approval from the MBT director of graduate studies.

- MBT 6226 - Negotiation Techniques in Taxation (2.0 cr)
- MBT 6333 - Tax Aspects of Consolidated Returns (2.0 cr)
- MBT 6335 - Taxation of the Small Business Corporation (2.0 cr)
- MBT 6346 - ASC 740 Computations and Analysis (2.0 cr)
- MBT 6348 - Advanced ASC 740 Concepts (2.0 cr)
- MBT 6351 - Wealth Transfer I (Estates and Gifts) (2.0 cr)
- MBT 6353 - Income Taxation of Fiduciaries (2.0 cr)
- MBT 6363 - Compensation and Benefits (2.0 cr)
- MBT 6371 - Taxation of Property Transactions (2.0 cr)
- MBT 6382 - Tax Aspects of International Business II (2.0 cr)
- MBT 6383 - Transfer Pricing (2.0 cr)

Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.
Twin Cities Campus
Closely-Held Business Taxation Postbaccalaureate Certificate
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455. Phone: 612-624-7511.
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/degrees/master-business-taxation

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Closely-Held Business Taxation PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Closely-Held Business Taxation certificate is designed for tax professionals seeking a credential that identifies them as a tax expert in the field while preparing graduates for greater responsibilities in business management and consulting. A rigorous curriculum, taught online by top faculty in the tax community, focuses on the analytical, problem solving, writing, and communication skills that foster career advancement. The certificate can be completed in 12 to 24 months, with breaks from early March through April 15 to accommodate schedules during peak tax season.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Required prerequisites
Introduction to Financial Reporting
ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course taken at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University's admission system.

For additional application details, review the MBT admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses (10 credits)
Take the following courses:
- MBT 6335 - Taxation of the Small Business Corporation (2.0 cr)
- MBT 6341 - Taxation of Partners and Partnerships (2.0 cr)
- MBT 6351 - Wealth Transfer I (Estates and Gifts) (2.0 cr)
- MBT 6363 - Compensation and Benefits (2.0 cr)
- MBT 6371 - Taxation of Property Transactions (2.0 cr)

Elective Course (2 credits)
Select one of the following courses to meet the 12-credit requirement:
- MBT 6201 - Tax Accounting Methods I (2.0 cr)
- MBT 6221 - Tax Research, Communication, and Practice (4.0 cr)
- MBT 6226 - Negotiation Techniques in Taxation (2.0 cr)
- MBT 6231 - Corporate Taxation I (2.0 cr)
- MBT 6333 - Tax Aspects of Consolidated Returns (2.0 cr)
- MBT 6346 - ASC 740 Computations and Analysis (2.0 cr)
- MBT 6347 - Tax Technology and Analytics Fundamentals (2.0 cr)
- MBT 6353 - Income Taxation of Fiduciaries (2.0 cr)
- MBT 6361 - State and Local Taxation (2.0 cr)
- MBT 6381 - Tax Aspects of International Business I (2.0 cr)
- MBT 6383 - Transfer Pricing (2.0 cr)
- MBT 6501 - Business, Government, and Economic Tax Policy (2.0 cr)
Twin Cities Campus
Corporate Financial Management Postbaccalaureate Certificate
Finance
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
phone 612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Corporate Financial Management PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Corporate Finance certificate is a curated introductory credential that lays out the foundations of the discipline for those seeking to enter or advance. It is designed to convey a comprehensive understanding of financial management principles, the essentials of financial planning and analysis, major financial decisions and business valuation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (6 credits)
Take the following courses:
MBA 6031 - Financial Accounting (3.0 cr)
MBA 6231 - Financial Management (3.0 cr)
Electives (6 credits)
Select 6 credits from the following:
FINA 6111 - Financing over a Firm’s Lifecycle (1.0 cr)
FINA 6112 - Private Equity (1.0 cr)
FINA 6113 - Public Equity (1.0 cr)
FINA 6211 - Cash Flows and Project Selection (1.0 cr)
FINA 6212 - Working Capital Management (1.0 cr)
FINA 6213 - Financial Capital Structure (1.0 cr)
FINA 6214 - Business Valuation (1.0 cr)
FINA 6222 - Mergers and Acquisitions (2.0 cr)
FINA 6322 - Financial Modeling (2.0 cr)
FINA 6511 - Options for Corporate Finance (1.0 cr)
FINA 6611 - Finance for Multinationals (1.0 cr)
**Twin Cities Campus**

**Doctor of Business Administration D.B.A.**

CSOM Financial Services Office  
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

**Contact Information:**  
Carlson Global Institute  
Carlson School of Management  
321-19th Ave S  
Minneapolis, MN 55455  
612-625-8961  
Email: cgi@umn.edu  
Website: http://carlsonschool.umn.edu/faculty-research/carlson-global-institute

- **Program Type:** Doctorate  
- **Requirements for this program are current for Fall 2022**  
- **Length of program in credits:** 56  
- **This program requires summer semesters for timely completion.**  
- **The program will be taught by faculty members from Tsinghua SEM in Beijing, China and the Carlson School in equal proportions with each school responsible for delivering 50% of the curriculum. The program will be offered in modular format. A total of 16 modules will be required with 2 modules back-to-back in the middle of the program at the Carlson School. All overseas modules will occur in Beijing. Instruction will occur in hotels and on campus at Tsinghua University.**  
- **Degree: Doctor of Business Administration**

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The proposed 56-credit, cohort-based DBA program is an applied, professional doctoral program directed at high-level executives working in China and the surrounding region. The DBA will go beyond the MBA to prepare participants to better face challenges and pursue opportunities in a complex, global business environment. The program will focus on the application rather than the creation of knowledge. A required thesis will involve an applied perspective that yields case studies or comparative studies of corporate actions. The program is a part-time, cohort-based program for fully-employed individuals. Course instruction for the DBA program will be provided by faculty members from both the Carlson School and Tsinghua SEM.

**Accreditation**  
This program is accredited by AACSB International

**Program Delivery**  
This program is available:  
* via classroom (the majority of instruction is face-to-face)*

**Prerequisites for Admission**  
An appropriate baccalaureate degree or higher is required for admission.

Other requirements to be completed before admission:  
15 years of high-level management experience.

**Special Application Requirements:**  
Admission is handled through Tsinghua University, who will recruit and make recommendations on candidates. The Carlson School will either accept or reject recommended candidates. Approved students will be admitted to the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**  
32 credits are required in the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

**CORE COURSES**
Students must complete all of the following courses:
Take exactly 32 credit(s) from the following:
- GDBA 7101 - Critical Thinking and Leadership (2.0 cr)
- GDBA 7102 - Exploration of Tsinghua University (2.0 cr)
- GDBA 7103 - Financial Market and Investment Decision Making (2.0 cr)
- GDBA 7104 - International Environment and National Strategy (2.0 cr)
- GDBA 7105 - Management Psychology (2.0 cr)
- GDBA 7106 - Management Wisdom Learned from History (2.0 cr)
- GDBA 7107 - Sinology Wisdom and Management Innovation (2.0 cr)
- GDBA 7108 - The Macroeconomic Situation and Policy (2.0 cr)
- GDBA 7201 - Global Strategic Alliances (2.0 cr)
- GDBA 7202 - Innovation through Emerging Technologies (2.0 cr)
- GDBA 7203 - Marketing Strategies for Firms in the Era of Globalization (1.0 cr)
- GDBA 7204 - Qualitative Research Methods (1.0 cr)
- GDBA 7205 - Global Accounting (1.0 cr)
- GDBA 7206 - Mergers and Acquisitions (1.0 cr)
- GDBA 7207 - Family Wealth Management (1.0 cr)
- GDBA 7208 - Management of Headquarters (1.0 cr)
- GDBA 7209 - Service Operations Management (1.0 cr)
- GDBA 7210 - Fundamental Data Analysis (1.0 cr)
- GDBA 7211 - Global Branding (2.0 cr)
- GDBA 7212 - Global Talent Management (2.0 cr)

**Thesis Credits**
Take exactly 24 credit(s) from the following:
- GDBA 7888 - Thesis (12.0 cr)
**Twin Cities Campus**

**Entrepreneurship & Innovation Postbaccalaureate Certificate**

CSOM Strategic Mgmt & Entrepren

Curtis L. Carlson School of Management

Link to a [list of faculty](#) for this program.

**Contact Information:**
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: [https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business](https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Entrepreneurship and Innovation PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

How do you take a new idea or technology and turn it into a commercially successful offering? The post-baccalaureate certificate in Entrepreneurship & Innovation brings together a set of courses designed to help take you through that journey: from idea generation and opportunity identification, through business planning, funding, product development and testing, all the way to managing a growing business. Whether your goal is to learn how to start a new firm or grow a creative idea within an existing one, this certificate offers a fundamental understanding of the principles through which new innovations achieve and sustain success.

**Program Delivery**
This program is available:
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

**Special Application Requirements:**
International students must have an acceptable score on the Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS), or the Pearson Test of English Academic (PTE).

International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at [https://isss.umn.edu/](https://isss.umn.edu/).

Applicants must submit their test score(s) from the following:
- Pearson Test of English Academic (PTE)

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Courses (6 credits)**
Take the following courses:
- ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
- MGMT 6055 - Management of Innovation and Change (2.0 cr)
- MGMT 6071 - Strategic Management of Technological Change (2.0 cr)

**Electives (6 credits)**
Select 6 credits from the following:
- ENTR 6021 - Developing New Ventures (2.0 cr)
- ENTR 6023 - Financing Business Ventures (2.0 cr)
- ENTR 6036 - Managing the Growing Business (2.0 cr)
- ENTR 6037 - Corporate Venturing (2.0 cr)
- MGMT 5102 - StartUp: Customer Development and Testing (2.0 cr)
- ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
  or ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
Twin Cities Campus
Finance M.S.
Finance
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Phone: 612-625-5555
Email: msf@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-science-in-finance

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 39
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The 39-credit master of science program in finance provides students with an advanced understanding of the tools and methods used in businesses and in financial markets. The program focuses on combining financial theory with quantitative and computational methods and real-world applications. Students can complete this full-time graduate program in 10 or 16 months. Graduates will be able to analyze and interpret complex financial data and communicate its implications. Successful applicants begin their MS studies in summer (July).

Accreditation
This program is accredited by AACSB International. The M.S. in Finance is STEM designated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
- University level courses in calculus and statistics are required.
- Linear algebra is recommended, but not required.
- Work experience is not required, but preferred.

Additional requirements for MSF Research Track:
- Linear Algebra
- Intermediate Microeconomics
- Intermediate Macroeconomics

Special Application Requirements:
Applicants must submit all application materials through the University's admissions system. Application materials include:
- Online application & application fee.
- Transcripts from all colleges/universities previously attended. Non-English transcripts must be accompanied by an English translation.
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score. A GMAT/GRE waiver is available for qualified candidates.
- For international and domestic applicants whose first language is not English, an acceptable score on the Test of English as a Foreign Language (TOEFL), International Language Testing System (IELTS), or Pearson (PTE).
- Two recommendations need to be submitted through the online application.
- A personal statement of career goals, and objectives for pursuing a MS Finance degree. The personal statement questions are the
following:

(1) Why are you interested in studying at the Carlson School of Management at the University of Minnesota? What draws you to the Carlson School's MSF program specifically? (approx. 200 words)

(2) Briefly describe your short-term and long-term career goals. How will completing an MS in Finance program at this time help you toward achieving your goals? (approx. 300 words)

(3) What do you feel makes you a strong candidate for the program? How will you contribute to the program overall? (approx. 250 words)

(4) Additional question required for MSF Research Track: Please briefly describe any research experience that you had before. What did you learn from your research experience?

- Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Applicants may choose to submit an essay to comment on any item(s) in their application they consider worthy of further explanation.
- Video Essay.
- Interview (by invitation only).

https://carlsonschool.umn.edu/degrees/master-science-in-finance/admissions/application-requirements

Applicants must submit their test score(s) from the following:

- GRE
- GMAT

International applicants must submit score(s) from one of the following tests:

- TOEFL
- IELTS

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 39 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Students engage in full-semester experiential learning application of finance theory and quantitative, computational skills learned throughout the program to analyze real financial challenges for real client companies. The final project consists of the development and presentation of results, interpretations, insights, and recommendations, which client companies then use in their business practices.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Required Courses: Summer (9 credits)
Take the following courses:

- MSF 6031 - Financial Accounting (3.0 cr)
- MSF 6221 - Finance I: Risk, Return, and Value (2.0 cr)
- MSF 6421 - Computing for Finance: Excel/VBA I & II (2.0 cr)
- MSF 6921 - Introduction to Python (2.0 cr)

Required Courses: Fall (14 credits)
Take the following courses:

- MSF 6121 - Fixed Income and Securities (2.0 cr)
- MSF 6222 - Finance II: Cash Flows, Managerial Decisions, and Project Valuation (2.0 cr)
- MSF 6223 - Fundamentals of Finance III (2.0 cr)
- MSF 6321 - Quantitative Portfolio Analysis (2.0 cr)
- MSF 6322 - Corporate Valuation and Modeling (2.0 cr)
- MSF 6422 - Financial Econometrics and Computational Methods I (2.0 cr)
- MSF 6423 - Financial Econometrics and Computational Methods II (2.0 cr)

Required Courses: Spring (12 credits)
Take the following courses:

- MSF 6021 - Communications for Finance (2.0 cr)
- MSF 6424 - Introduction to Machine Learning for Finance (2.0 cr)
- MSF 6522 - Derivatives and Risk Management (2.0 cr)
- MSF 6621 - Finance within the Macroeconomy (2.0 cr)
**Electives (4 credits)**  
Select 4 elective credits from the following, or graduate courses offered by other departments in the business school upon approval.  
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)  
- FINA 6112 - Private Equity (1.0 cr)  
- FINA 6113 - Public Equity (1.0 cr)  
- FINA 6123 - Financial Services Industry (2.0 cr)  
- FINA 6125 - Cryptocurrency, Blockchain, and Their Business Applications (2.0 cr)  
- FINA 6222 - Mergers and Acquisitions (2.0 cr)  
- FINA 6324 - Securitization Markets (2.0 cr)  
- FINA 6325 - Behavioral Finance (2.0 cr)  
- FINA 6341 - World Economy (4.0 cr)  
- FINA 6621 - International Financial Management (2.0 cr)  

**Non-Credit Courses**  
Noncredit 1: On occasion, external speakers will be brought in to enhance the experiential learning component of the MS finance program. Students are required to attend such meetings, and their participation will be assessed on a pass/fail basis.

Noncredit 2: Students will be required to pass the online ethics module from the Chartered Financial Analyst Institute by the end of the summer. Successful completion will be a requirement of the Fundamentals of Finance II course.

**Joint- or Dual-degree Coursework:** MS-Finance/MS-Business Analytics  
Student may take a total of 22 credits in common among the academic programs.
Twin Cities Campus
High Net-Worth Individual Taxation Postbaccalaureate Certificate
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455. Phone: 612-624-7511.
Email: mbt@umn.edu
Website: http://carlsonschool.umn.edu/degrees/master-business-taxation

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: High Net-Worth Individual Taxation PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The High Net-Worth Individual Taxation certificate is designed for tax professionals seeking a credential that identifies them as a tax expert in the field while preparing graduates for greater responsibilities in financial consulting. A rigorous curriculum, taught online by top faculty in the tax community, focuses on the analytical, problem solving, writing, and communication skills that foster career advancement. The certificate can be completed in 12 to 24 months, with breaks from early March through April 15 to accommodate schedules during peak tax season.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Required prerequisites
Introduction to Financial Reporting
ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course taken at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University's admission system.

For additional application details, review the MBT admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses (12 credits)
Take the following courses:
- MBT 6221 - Tax Research, Communication, and Practice (4.0 cr)
- MBT 6351 - Wealth Transfer I (Estates and Gifts) (2.0 cr)
- MBT 6353 - Income Taxation of Fiduciaries (2.0 cr)
- MBT 6363 - Compensation and Benefits (2.0 cr)
- MBT 6371 - Taxation of Property Transactions (2.0 cr)
Human Resources and Industrial Relations M.H.R.I.R.

CSOM Work & Organizations

Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Center for Human Resources and Labor Studies, Suite 3-300 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-2500; fax: 612-624-8360) 55455
Email: hrirgrad@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-arts-human-resources-industrial-relations

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 49
- This program does not require summer semesters for timely completion.
- Degree: Masters Human Resources and Industrial Relations

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human resources and industrial relations (HRIR) students study the employment relationship. Teaching and research are guided by the belief that the employment relationship must be investigated through the lenses of different disciplines using systems thinking. The professional master of arts degree is for individuals interested in private and public sector careers in human resource management, labor relations, and related fields.

The curriculum is structured around the core HRIR areas of staffing, training, and development; compensation and benefits; and labor relations and collective bargaining. It is rooted in key concepts from the social and behavioral sciences and business, such as organizational behavior and theory, labor market analysis, leadership, and strategy. Quantitative analysis of employment problems and issues are also included. Master's candidates are encouraged to choose electives to support a generalist orientation with key business knowledge.

MHRIR offers both full and part-time options.

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Entering students have undergraduate degrees in many subjects ranging from the fine arts to engineering. The most common undergraduate majors of incoming students are in the areas of psychology, business, economics, human resources management, human resource development, and speech communication. An undergraduate course in microeconomics must be completed with a grade of at least C before matriculating.

Special Application Requirements:
Applicants must submit three letters of recommendation, a complete set of transcripts, a résumé, personal statements, and GRE or GMAT scores are preferred but not required. (Check MHRIR website for more information if you choose not to submit GRE/GMAT scores.) Applicants whose native language is not English must also submit score results from the TOEFL or IELTS. Students may enter the full-time MHRIR program in either the fall or spring semesters. The application deadlines are June 15 for fall admission and October 15 for spring admission. The MHRIR financial aid deadline for fall semester is February 1. Applicants are encouraged to apply by the deadlines, however applications are accepted after the deadlines have passed if space allows.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
Program Requirements

Plan C: Plan C requires 41 major credits and 8 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MHRIR is offered as a coursework-only program with day (full-time) and evening (part-time) options. Commonly selected related fields include accounting, finance, operations management, managerial communications, economics, human resource development, law, psychology, public affairs, sociology, and research methods.

Submission of the Individual Reflection Paper at the end of the final semester in the program is a requirement that is recorded as a milestone. This paper is designed to help students make connections and uncover insights (personal, business, cultural, sociological, professional, etc.) about their experiences in the MHRIR Program.

Core Courses (24 credits)
Take the following courses.

HRIR 6001 - Business Principles for the HRIR Professional (4.0 cr)
HRIR 6111 - Using Data and Metrics in Human Resources and Industrial Relations (4.0 cr)
HRIR 6301 - Staffing, Training, and Development (4.0 cr)
HRIR 6401 - Organizational Theory Foundations of High-Impact HRIR (2.0 cr)
HRIR 6441 - Organizational Behavior Foundations of High-Impact HRIR (2.0 cr)
HRIR 6501 - Compensation and Benefits (4.0 cr)
HRIR 6701 - Labor Relations and Collective Bargaining (4.0 cr)

HRIR Leadership Practicum (1 credit)
One credit of HRIR 6805 is required for all full-time and part-time MHRIR students. Full-time students must take HRIR 6805 in two semesters for 0.5 credits each. Part-time students must take HRIR 6805 in one semester for one credit.

HRIR 6805 - HRIR Leadership Practicum (0.5 - 1.0 cr)

Economic Issues Analysis (2-3 credits)
Select one of the following courses.

HRIR 5655 - Public Policies on Work and Pay (3.0 cr)
or HRIR 5662 - Personnel Economics (2.0 cr)

Experiential Learning Capstone (2 credits)
Take the following course.

HRIR 6801 - HRIR in Practice: Strategy, Execution, and Ethics (2.0 cr)

Electives (20 credits)
Complete at least 12 credits of HRIR electives and at least 8 credits of related field electives.

Take 20 or more credit(s) including 2 or more sub-requirement(s) from the following:

HRIR Electives
Take 12 or more credit(s) from the following:

• HRIR 5000 - Topics in HRIR (2.0 cr)
• HRIR 5222 - Creating and Managing Diversity and Inclusion (2.0 cr)
• HRIR 5252 - Employment and Labor Law for the HRIR Professional (2.0 cr)
•HRIR 5442 - Employee Performance Management: Strategies, Systems, and Skills (2.0 cr)
•HRIR 5443 - Principles of Effective Coaching (2.0 cr)
•HRIR 5450 - Change in the Workplace (2.0 cr)
•HRIR 5992 - Independent Study in Human Resources and Industrial Relations (1.0 - 8.0 cr)
•HRIR 6000 - Graduate Topics in Human Resources and Industrial Relations (1.0 - 8.0 cr)
•HRIR 6112 - People Analytics (2.0 cr)
•HRIR 6114 - Human Resource Information Systems (2.0 cr)
•HRIR 6302 - Staffing and Selection: Strategic and Operational Concerns (2.0 cr)
•HRIR 6303 - Employee Training: Creating a Learning Organization (2.0 cr)
•HRIR 6304 - Employee Development: Creating a Competitive Advantage (2.0 cr)
•HRIR 6444 - Employee Motivation, Engagement, and Well-being (2.0 cr)
•HRIR 6484 - Management of Teams (2.0 cr)
•HRIR 6502 - Rewards Management Strategies (2.0 cr)
•HRIR 6503 - Employer-Sponsored Employee Benefit Programs (2.0 cr)
•MGMT 6484 - Management of Teams (2.0 cr)
•MGMT 6631 - Employment Discrimination (3.0 cr)
•MGMT 6632 - Employment Law (3.0 cr)
•MGMT 6633 - Alternative Dispute Resolution (3.0 cr)
•MBA 6031 - Financial Accounting (3.0 cr)
•MBA 6211 - Marketing Management (3.0 cr)
•MBA 6221 - Supply Chain & Operations (3.0 cr)
•MBA 6231 - Financial Management (3.0 cr)
•MBA 6301 - Strategic Management (3.0 cr)
•MBA 6315 - The Ethical Environment of Business (2.0 cr)
•MCOM 5400 - Managerial Communications for the HR Professional (2.0 cr)
•MCOM 5515 - Persuasive Writing in Business (2.0 cr)
•MCOM 5535 - Strategies and Skills for Managerial Presentations (2.0 cr)
•MGMT 6004 - Negotiation Strategies (2.0 cr)
•MGMT 6033 - Strategy Implementation (2.0 cr)
•MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
•MGMT 6041 - Competing Globally (2.0 cr)
•MGMT 6055 - Management of Innovation and Change (2.0 cr)
•MILL 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
•MSBA 6250 - Analytics for Competitive Advantage (3.0 cr)
•OLPD 5033 - Foundations of Individual/Organizational Career Development (3.0 cr)
•OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
•OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
•OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
•OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
•OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
•OLPD 5616 - Instructional Design for e-Learning (3.0 cr)
•OLPD 5619 - Planning and Decision-Making Skills (1.0 cr)
•PA 5251 - Strategic Planning and Management (3.0 cr)
•PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
•PUBH 6102 - Issues in Environmental Health (2.0 cr)
•PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
•PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
•PUBH 6542 - Management of Health Care Organizations (3.0 cr)
•SCO 6041 - Project Management (2.0 cr)
•CSPH 5805 - Wellbeing in the Workplace (3.0 cr)

Related Field
Take 8 or more credit(s) from the following:
•CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
•IBUS 5xxx
•IBUS 6xxx
•IDSC 6041 - Information Technology Management (2.0 cr)
•IDSC 6471 - Knowledge Management (2.0 cr)
•IDSC 6481 - Managerial Decision Making (2.0 cr)
•LAW 6203 - Labor Law (3.0 cr)
•LAW 6631 - Employment Discrimination (3.0 cr)
•LAW 6632 - Employment Law (3.0 cr)
•LAW 6833 - Alternative Dispute Resolution (3.0 cr)
•MBA 6031 - Financial Accounting (3.0 cr)
•MBA 6211 - Marketing Management (3.0 cr)
•MBA 6221 - Supply Chain & Operations (3.0 cr)
•MBA 6231 - Financial Management (3.0 cr)
•MBA 6301 - Strategic Management (3.0 cr)
•MBA 6315 - The Ethical Environment of Business (2.0 cr)
•MCOM 5400 - Managerial Communications for the HR Professional (2.0 cr)
•MCOM 5515 - Persuasive Writing in Business (2.0 cr)
•MCOM 5535 - Strategies and Skills for Managerial Presentations (2.0 cr)
•MGMT 6004 - Negotiation Strategies (2.0 cr)
•MGMT 6033 - Strategy Implementation (2.0 cr)
•MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
•MGMT 6041 - Competing Globally (2.0 cr)
•MGMT 6055 - Management of Innovation and Change (2.0 cr)
•MILL 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
•MSBA 6250 - Analytics for Competitive Advantage (3.0 cr)
•OLPD 5033 - Foundations of Individual/Organizational Career Development (3.0 cr)
•OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
•OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
•OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
•OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
•OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
•OLPD 5616 - Instructional Design for e-Learning (3.0 cr)
•OLPD 5619 - Planning and Decision-Making Skills (1.0 cr)
•PA 5251 - Strategic Planning and Management (3.0 cr)
•PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
•PUBH 6102 - Issues in Environmental Health (2.0 cr)
•PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
•PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
•PUBH 6542 - Management of Health Care Organizations (3.0 cr)
•SCO 6041 - Project Management (2.0 cr)
•CSPH 5805 - Wellbeing in the Workplace (3.0 cr)

Joint- or Dual-degree Coursework: MBA/MHRIR
Student may take a total of 24 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.
Part-Time MHRIR
This sub-plan is limited to students completing the program under Plan C.

Integrated BS-Business/Master in HRIR
The Carlson School offers an integrated Bachelor of Science in Business (BSB) and Master of Human Resources and Industrial Relations (MHRIR). The integrated degree program (IDP) offers students the opportunity to earn a bachelor's degree and a master's degree in five years. This program offers several benefits: streamlined admissions from the undergraduate to the graduate program; flexibility in fulfilling required courses for both degrees during the senior year (up to 13 credits can be applied to the graduate program); and a quicker move to more strategic HR positions in the job market. The fourth year of an IDP student's undergraduate degree will be taken as part of the first-year cohort for the MHRIR program. Coursework cannot be applied to both degree requirements. 12 of the credits taken as part of that first-year cohort will be counted towards the BSB degree and the remaining 13 will be applied to the MHRIR degree. The student must be awarded their BSB degree before finishing the MHRIR program in the fifth year of their IDP. Application to the BSB/MHRIR IDP is open to any Carlson School undergraduate student in the fall of their third (junior) year. Any student applying for the IDP program must complete all the requirements for the MHRIR application and go through the application process in its entirety.
Twin Cities Campus
International Taxation Postbaccalaureate Certificate
Accounting
Curtis L. Carlson School of Management

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455. Phone: 612-624-7511.
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/degrees/master-business-taxation

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: International Taxation Postbaccalaureate Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The International Taxation certificate is designed for tax professionals seeking a credential that identifies them as an expert in the field while preparing graduates for greater responsibilities in business management and consulting. A rigorous curriculum, taught online by top faculty in the tax community, focuses on the analytical, problem solving, writing, and communication skills that foster career advancement. The certificate can be completed in 12 to 24 months, with breaks from early March through April 15 to accommodate schedules during peak tax season.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Required prerequisites
Introduction to Financial Reporting
ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course taken at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University's admission system.

For additional application details, review the MBT admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses (10 credits)
Take the following courses:
MBT 6231 - Corporate Taxation I (2.0 cr)
MBT 6232 - Corporate Taxation II (2.0 cr)
MBT 6381 - Tax Aspects of International Business I (2.0 cr)
MBT 6382 - Tax Aspects of International Business II (2.0 cr)
MBT 6383 - Transfer Pricing (2.0 cr)

Elective Course (2 credits)
Select one of the following courses to meet the 12-credit requirement:
MBT 6201 - Tax Accounting Methods I (2.0 cr)
MBT 6221 - Tax Research, Communication, and Practice (4.0 cr)
MBT 6226 - Negotiation Techniques in Taxation (2.0 cr)
MBT 6333 - Tax Aspects of Consolidated Returns (2.0 cr)
MBT 6335 - Taxation of the Small Business Corporation (2.0 cr)
MBT 6341 - Taxation of Partners and Partnerships (2.0 cr)
MBT 6346 - ASC 740 Computations and Analysis (2.0 cr)
MBT 6347 - Tax Technology and Analytics Fundamentals (2.0 cr)
MBT 6351 - Wealth Transfer I (Estates and Gifts) (2.0 cr)
MBT 6353 - Income Taxation of Fiduciaries (2.0 cr)
MBT 6361 - State and Local Taxation (2.0 cr)
MBT 6363 - Compensation and Benefits (2.0 cr)
MBT 6371 - Taxation of Property Transactions (2.0 cr)
MBT 6501 - Business, Government, and Economic Tax Policy (2.0 cr)
Twin Cities Campus
Leadership for Managers Postbaccalaureate Certificate
CSOM Work & Organizations
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
321 19th Ave S
1-110 Carlson School
Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Leadership for Managers Postbaccalaureate Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Leadership for Managers Certificate offers candidates a challenging academic curriculum that teaches critical management, team leadership, and problem-solving skills. Candidates will apply real world knowledge through hands-on opportunities and develop a culture of teamwork and collaboration to meet organizational goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (12 credits)
Take the following courses:
HRIR 5450 - Change in the Workplace (2.0 cr)
MBA 6111 - Leading Others (2.0 cr)
MGMT 6004 - Negotiation Strategies (2.0 cr)
MGMT 6084 - Management of Teams (2.0 cr)
MGMT 6310 - Cross-Cultural Management: Developing Intercultural Competence (2.0 cr)
MGMT 6465 - Leadership and Personal Development (2.0 cr)
Twin Cities Campus
Management Science M.B.A.
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
MBA Programs Office, 1-110 Carlson School, 321 19th Ave S, Minneapolis, MN 55455 (612-625-5555)
Email: mba@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-business-administration

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Master of Business Administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Carlson Schools Management Science MBA degree is a full-time MBA degree that covers traditional management topics across business disciplines while focusing on developing students capabilities in a specific set of skills including statistical modeling, programming, forecasting, and operations research techniques to better understand business organizational performance. The curriculum includes a variety of mathematical, statistical modeling, and testing techniques.

Accreditation
This program is accredited by AACSB

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
Applicants must have an acceptable score on the GMAT or GRE. In addition, international students must have an acceptable score on the Test of English as a Foreign Language (TOEFL), the International Language Testing System (IELTS), or the Pearson Test of English Academic (PTE Academic).

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
- Pearson Test of English Academic (PTE Academic)

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 64 major credits and up to null credits outside the major. There is no final exam.
This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

All students must complete a zero-credit internship course in the spring term of the first year of study. In addition, students must complete work experience (internship, fellowship, etc.) during the two-year program.

All students must complete a 4-credit study abroad experience or on-campus course designed to satisfy the international experience requirement.

**Financial Accounting**
- MBA 6031 - Financial Accounting (3.0 cr)

**Data Analysis & Statistics**
- MBA 6121 - Data Analysis and Statistics for Managers (3.0 cr)

**Managerial Economics**
- MBA 6141 - Managerial Economics (2.0 cr)

**Marketing**
- MBA 6211 - Marketing Management (3.0 cr)

**Supply Chain & Operations**
- MBA 6221 - Supply Chain & Operations (3.0 cr)

**Financial Management**
- MBA 6231 - Financial Management (3.0 cr)

**IT Management**
- MBA 6241 - Competing in a Data-Driven Digital Age (2.0 cr)

**Strategic Management**
- MBA 6301 - Strategic Management (3.0 cr)

**Business Ethics**
- MBA 6315 - The Ethical Environment of Business (2.0 cr)

**Analytics Requirement**
Take the following courses. Take IDSC 6444 in Spring of first year.
- IDSC 6444 - Business Analytics for Managers I (2.0 cr)
- IDSC 6446 - Business Analytics for Managers II (2.0 cr)

**Leadership Requirement**
The total leadership credit requirement is 4 credits. MBA 6110 is completed in spring of the first year for a total of 2 credits. Additionally, students must complete MGMT 6465 for 2 credits prior to degree completion.
- MBA 6111 - Leading Others (2.0 cr)
- MGMT 6465 - Leadership and Personal Development (2.0 cr)

**Internship Requirement**
MBA students are required to complete work experience during the program. Students will be enrolled in a zero-credit course in their first spring semester prior to work experience in the summer.
- MBA 6999 - Full Time MBA Internship Course (0.0 cr)

**Enterprise Requirement**
All students are required to participate in one Enterprise program throughout their time in the program. Take 8 or more credit(s) from the following:
- MBA 6501 - Carlson Funds Enterprise: Growth (1.0 - 4.0 cr)
- MBA 6502 - Carlson Funds Enterprise: Fixed Income (1.0 - 4.0 cr)
- MBA 6503 - Carlson Ventures Enterprise (2.0 - 4.0 cr)
- MBA 6504 - Carlson Consulting Enterprise (1.0 - 4.0 cr)
- MBA 6505 - Carlson Brand Enterprise (2.0 - 4.0 cr)

**International Experience**
All Management Science MBA students must participate in an international study abroad program or complete a course that has been designated to meet this requirement. A minimum of 4 credits is required. If more are taken, remainder will count as MBA elective credit(s).

Take 1 or more course(s) totaling 4 or more credit(s) from the following:
- IBUS 5xxx
- IBUS 6xxx
- IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
- MGMT 6305 - The International Environment of Business (4.0 cr)
- MILI 6997 - MILI Global Valuation Lab (4.0 cr)
- MKTG 6072 - International Marketing (4.0 cr)
- SCO 6081 - Global Operations Strategy (4.0 cr)

**MBA STEM Electives**

Students must take 12 credits from the following STEM designated courses.

Take 12 or more credit(s) from the following:
- ACCT 6606 - Financial Data Analytics (2.0 cr)
- FINA 5529 - Derivatives II (2.0 cr)
- FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
- FINA 6321 - Portfolio Analysis and Management (2.0 cr)
- FINA 6322 - Financial Modeling (2.0 cr)
- FINA 6323 - Advanced Financial Modeling (2.0 cr)
- FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
- FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
- IDSC 6051 - Information Technologies and Solutions (2.0 cr)
- IDSC 6423 - Enterprise Systems (2.0 cr)
- IDSC 6442 - E-Sourcing and E-Auctions (2.0 cr)
- MBT 6347 - Tax Technology and Analytics Fundamentals (2.0 cr)
- MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
- MILI 6963 - Healthcare Analytics (2.0 cr)
- MKTG 6051 - Marketing Research - Rapid Insights (2.0 cr)
- MKTG 6052 - Marketing Analytics: Managerial Decisions (2.0 cr)
- MKTG 6075 - Pricing Strategy (4.0 cr)
- MKTG 6086 - Digital Marketing (2.0 cr)
- SCO 6041 - Project Management (2.0 cr)
- SCO 6048 - Logistics and Transportation (2.0 cr)
- SCO 6051 - Service Management (2.0 cr)
- SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
- SCO 6085 - Sales, Inventory, and Operations Planning (2.0 cr)
- SCO 6091 - Process Improvement Methods (2.0 cr)
- SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
- SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
- SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)

**MBA Electives**

Students will take a minimum of 8 credits.

Take 8 or more credit(s) from the following:
- ACCT 5181 - Consolidations and Advanced Reporting (2.0 cr)
- ACCT 6102 - Financial Statement Analysis (2.0 cr)
- APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
- BLAW 6158 - The study of laws affecting private business and publicly-traded companies. (2.0 cr)
- ENTR 6021 - Developing New Ventures (2.0 cr)
- ENTR 6023 - Financing Business Ventures (2.0 cr)
- ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
- ENTR 6036 - Managing the Growing Business (2.0 cr)
- ENTR 6037 - Corporate Venturing (2.0 cr)
- ENTR 6041 - Initiating New Product Design and Business Development (4.0 cr)
- ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
- FINA 6111 - Financing over a Firm's Lifecycle (1.0 cr)
- FINA 6112 - Private Equity (1.0 cr)
- FINA 6113 - Public Equity (1.0 cr)
- FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
- FINA 6122 - Financial Management of Depository Institutions (2.0 cr)
- FINA 6123 - Financial Services Industry (2.0 cr)
- FINA 6125 - Cryptocurrency, Blockchain, and Their Business Applications (2.0 cr)
- FINA 6211 - Cash Flows and Project Selection (1.0 cr)
- FINA 6212 - Working Capital Management (1.0 cr)
• FINA 6213 - Financial Capital Structure (1.0 cr)
• FINA 6214 - Business Valuation (1.0 cr)
• FINA 6215 - The CFO Mindset: Finance, Strategy and Operations (1.0 cr)
• FINA 6222 - Mergers and Acquisitions (2.0 cr)
• FINA 6321 - Portfolio Analysis and Management (2.0 cr)
• FINA 6322 - Financial Modeling (2.0 cr)
• FINA 6323 - Advanced Financial Modeling (2.0 cr)
• FINA 6324 - Securitization Markets (2.0 cr)
• FINA 6325 - Behavioral Finance (2.0 cr)
• FINA 6341 - World Economy (4.0 cr)
• FINA 6511 - Options for Corporate Finance (1.0 cr)
• FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
• FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
• FINA 6611 - Finance for Multinationals (1.0 cr)
• FINA 6621 - International Financial Management (2.0 cr)
• IDSC 6051 - Information Technologies and Solutions (2.0 cr)
• IDSC 6455 - Web 2.0: The Business of Social Media (2.0 cr)
• IDSC 6465 - Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovation (4.0 cr)
• IDSC 6471 - Knowledge Management (2.0 cr)
• IDSC 6481 - Managerial Decision Making (2.0 cr)
• INS 6101 - Employee Benefits (2.0 cr)
• INS 6105 - Corporate Risk Management (2.0 cr)
• INS 6200 - Insurance Theory and Practice (2.0 cr)
• MBA 6235 - Managerial Accounting (2.0 cr)
• MBA 6403 - Strategic Change in the Energy Industry (2.0 cr)
• MBA 6950 - MBA Topics (2.0 cr)
• MCOM 5500 - Enhancing Your Executive Image in Business Communications (2.0 cr)
• MCOM 5515 - Persuasive Writing in Business (2.0 cr)
• MCOM 5535 - Strategies and Skills for Managerial Presentations (2.0 cr)
• MGMT 5102 - StartUp: Customer Development and Testing (2.0 cr)
• MGMT 6004 - Negotiation Strategies (2.0 cr)
• MGMT 6031 - Industry Analysis and Competitive Strategy (4.0 cr)
• MGMT 6032 - Strategic Alliances (2.0 cr)
• MGMT 6033 - Strategy Implementation (2.0 cr)
• MGMT 6034 - Strategic Leadership (2.0 cr)
• MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
• MGMT 6041 - Competing Globally (2.0 cr)
• MGMT 6055 - Management of Innovation and Change (2.0 cr)
• MGMT 6071 - Strategic Management of Technological Change (2.0 cr)
• MGMT 6084 - Management of Teams (2.0 cr)
• MGMT 6085 - Corporate Strategy (4.0 cr)
• MGMT 6100 - Topics in Management (1.0 - 4.0 cr)
• MGMT 6305 - The International Environment of Business (4.0 cr)
• MGMT 6310 - Cross-Cultural Management: Developing Intercultural Competence (2.0 cr)
• MGMT 6402 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
• MGMT 6411 - Corporate Responsibility (2.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6421 - Healthcare Law: Strategic and Business Implications (2.0 cr)
• MILI 6562 - Information Technology in Health Care (2.0 cr)
• MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
• MILI 6920 - MILI Topic Course (2.0 cr)
• MILI 6963 - Healthcare Analytics (2.0 cr)
• MILI 6985 - The Health Care Marketplace (2.0 cr)
• MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
• MILI 6999 - Independent Study (0.0 - 8.0 cr)
• MKTG 6055 - Buyer Behavior (2.0 cr)
• MKTG 6062 - Marketing Channels (2.0 cr)
• MKTG 6072 - International Marketing (4.0 cr)
• MKTG 6073 - Marketing in High Tech Settings (2.0 cr)
• MKTG 6078 - Advertising & Promotion (4.0 cr)
• MKTG 6082 - Brand Strategy (2.0 cr)
• MKTG 6083 - Customer Analytics (2.0 cr)
• MKTG 6084 - Persuasion and Influence (2.0 cr)
• MKTG 6085 - Nudge: Improving Decisions about Health, Wealth and Happiness (2.0 cr)
• MKTG 6086 - Digital Marketing (2.0 cr)
• MKTG 6087 - Power of Story (1.0 cr)
• MKTG 6088 - Strategic Marketing (3.0 cr)
• MKTG 6090 - Marketing Topics (1.0 - 4.0 cr)
• SCO 6045 - Strategic Sourcing (2.0 cr)
• SCO 6059 - Quality Management and Lean Six Sigma (4.0 cr)
• SCO 6081 - Global Operations Strategy (4.0 cr)
• SCO 6092 - Supply Chain Risk and Security (2.0 cr)
• SCO 6094 - Responsible Supply Chain Management (2.0 cr)
• SCO 6095 - Supply Chain Management in the Food and Agribusiness Sector (2.0 cr)
• SCO 6097 - Supply Chain Management in the Retail Sector (2.0 cr)
• SCO 6192 - Supply Chain Finance (2.0 cr)
• SCO 6850 - Topics in Operations and Management Science (2.0 - 4.0 cr)
**Twin Cities Campus**

**Marketing M.MKTG**

**Curtis L. Carlson School of Management**

Link to a list of faculty for this program.

**Contact Information:**

Master of Marketing Program  
Carlson School of Management  
University of Minnesota  
321 - 19th Avenue South, Suite 1-110  
Minneapolis, MN 55455

Phone: 612-625-5555  
Email: msmk@umn.edu  
Website: https://carlsonschool.umn.edu/degrees/master-marketing

- Program Type: Master's  
- Requirements for this program are current for Fall 2022  
- Length of program in credits: 32  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Marketing

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Marketing M.MKTG program provides a strong foundation in marketing by combining a year of intentionally designed course work, an experiential project with a real client, the opportunity to gain industry connections, and job interview preparation through the Carlson School Graduate Business Career Center. Students who graduate from this full-time 9-month, 32-credit program will have substantial marketing capabilities including understanding interactions (e.g., social media, individual profiling, web site traffic), as well as the depth of knowledge of consumers (e.g., customer experience, big data, web site personalization) and will be able to successfully contribute to marketing functions in both small and large organizations.

**Accreditation**

This program is accredited by Carlson School of Management is accredited by AACSB International.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

Applicants must have a bachelor’s degree from an accredited college or university.

**Special Application Requirements:**

Applicants must submit all application materials through the University’s admissions system. Application materials include:

- Online application & application fee.
- Transcripts from all colleges/universities previously attended. Non-English transcripts must be accompanied by an English translation.
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score. A GMAT/GRE waiver is available for qualified candidates.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (IELTS).
- Two letters of recommendations need to be submitted through the online application.
- A personal statement of career goals, and objectives for pursuing a M.MKTG degree. The personal statement questions are the following:
  1. Briefly describe your short-term and long-term career goals. Why are you choosing to pursue a Master of Marketing at the Carlson School of Management, and what are you hoping to accomplish by doing so?
  2. Being a professional in marketing requires strong communication skills. Describe a time when you were able to successfully pitch or communicate an idea.
  3. What do you feel makes you a strong candidate for the program? How will you contribute to the program overall?
- Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Video Essay.
- Admissions interview (by invitation only).

For admissions details, please visit https://carlonschool.umn.edu/degrees/master-marketing/admissions/application-requirements

Applicants must submit their test score(s) from the following:
- GRE
- GMAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 32 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The Carlson Brand Enterprise (CBE) is a unique opportunity for our Master of Marketing students to work on a semester-long project with cross functional teams of graduate and undergraduate students. Each project focuses on strategic marketing projects for real companies and organizations, solving complex business challenges, utilizing strategic and analytical driven insights. Unlike most project-based student consultancies, the Carlson Brand Enterprise operates as a professional services firm, serving multiple external clients across a range of industries and business models by providing high impact, value added, objective solutions. Student consultants apply the concepts, principles, and frameworks they have learned in the classroom to practical and engaging business challenges with support from world class faculty and leading industry professionals.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Fall Semester (17 credits)
- MSMK 6051 - Marketing Intelligence (2.0 cr)
- MSMK 6055 - Buyer Behavior (2.0 cr)
- MSMK 6078 - Advertising and Promotion (2.0 cr)
- MSMK 6086 - Digital Marketing (2.0 cr)
- MSMK 6205 - Business Fundamentals for Marketing (3.0 cr)
- MSMK 6211 - Marketing Management (3.0 cr)
- MSMK 6281 - Customer Experience Management (2.0 cr)
- MSMK 6901 - Project Management (0.0 - 2.0 cr)

Spring Semester (15 credits)
- MSMK 6052 - Marketing Analytics: Decision Making (2.0 cr)
- MSMK 6076 - Customer Relationship Management (2.0 cr)
- MSMK 6082 - Brand Strategy (2.0 cr)
- MSMK 6088 - Strategic Marketing (3.0 cr)
- MSMK 6053 - Marketing Analytics: Insights (2.0 cr)
- MSMK 6505 - Enterprise Project (4.0 cr)
Medical Industry Postbaccalaureate Certificate

Curtis L. Carlson School of Management

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-business-administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Medical Industry certificate provides a curriculum that uses an interdisciplinary and intercollegiate approach to provide market analysis of promising medical technologies and services. Candidates will learn from industry experts on the healthcare marketplace, institutions, regulations, reimbursement, payment, and healthcare analytics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelor’s degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (6 credits)
Take the following courses:
- MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
- MILI 6963 - Healthcare Analytics (2.0 cr)
MILI 6985 - The Health Care Marketplace (2.0 cr)

**Electives (6 credits)**
Select 6 credits from the following:
- MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
- MILI 6421 - Healthcare Law: Strategic and Business Implications (2.0 cr)
- MILI 6562 - Information Technology in Health Care (2.0 cr)
- MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
- MILI 6920 - MILI Topic Course (2.0 cr)
- MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
- MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
- MILI 6997 - MILI Global Valuation Lab (4.0 cr)
- SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
Twin Cities Campus

Strategic Management Postbaccalaureate Certificate
CSOM Strategic Mgmt & Entrep
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-business-administration

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Strategic Management Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Strategic Management certificate draws on insights of strategic decisions that drive success or failure within an organization. Candidates will study cases, complete group projects, and dive deeply into curriculum that exposes them to the difficult landscape of organizational decision making.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (6 credits)
Take the following courses:
MBA 6031 - Financial Accounting (3.0 cr)
MBA 6301 - Strategic Management (3.0 cr)
Electives (6 credits)
Select 6 credits from the following:
- MGMT 6031 - Industry Analysis and Competitive Strategy (4.0 cr)
- MGMT 6032 - Strategic Alliances (2.0 cr)
- MGMT 6033 - Strategy Implementation (2.0 cr)
- MGMT 6041 - Competing Globally (2.0 cr)
- MGMT 6055 - Management of Innovation and Change (2.0 cr)
- MGMT 6071 - Strategic Management of Technological Change (2.0 cr)
- MGMT 6085 - Corporate Strategy (4.0 cr)
Twin Cities Campus

Strategic Marketing Postbaccalaureate Certificate
Marketing
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/graduate-certificates/general-business

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Strategic Marketing Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Strategic Marketing certificate explores the most current practices in digital, social media, and traditional marketing. The curriculum covers strategic decisions and creates a better understanding of the marketing needs of the firm, while leveraging the power of marketing techniques used in business today.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (6 credits)
Take the following courses:
- MBA 6211 - Marketing Management (3.0 cr)
- MKTG 6088 - Strategic Marketing (3.0 cr)
Electives (6 credits)
Select 6 credits from the following:
MKTG 6055 - Buyer Behavior (2.0 cr)
MKTG 6062 - Marketing Channels (2.0 cr)
MKTG 6072 - International Marketing (4.0 cr)
MKTG 6075 - Pricing Strategy (4.0 cr)
MKTG 6082 - Brand Strategy (2.0 cr)
MKTG 6086 - Digital Marketing (2.0 cr)
Twin Cities Campus

Supply Chain Management for the Medical and Health Sector Postbaccalaureate Certificate
Supply Chain & Operations
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
1-110 Carlson School of Management
321 19th Ave S, Minneapolis, MN 55455
612.625.5555
Email: carlsoncert@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-business-administration

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Supply Chain Medical & Health PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Supply Chain Management for the Medical & Health Sector certificate offers a foundation for supply chain operations in the medical industry and beyond. Curriculum focuses on an understanding of inputs to outputs, analysis of industrial resources and management of complex logistics, and supply chain found within the medical and healthcare sectors.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelors degree from an accredited institution.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework (7 credits)
Take the following courses:
MBA 6221 - Supply Chain & Operations (3.0 cr)
SCO 6051 - Service Management (2.0 cr)
SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)

**Electives (6 credits)**
Select 6 credits from the following:
MBA 6121 - Data Analysis and Statistics for Managers (3.0 cr)
SCO 6041 - Project Management (2.0 cr)
SCO 6045 - Strategic Sourcing (2.0 cr)
SCO 6048 - Logistics and Transportation (2.0 cr)
SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
SCO 6091 - Process Improvement Methods (2.0 cr)
SCO 6092 - Supply Chain Risk and Security (2.0 cr)
SCO 6094 - Responsible Supply Chain Management (2.0 cr)
SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)
SCO 6192 - Supply Chain Finance (2.0 cr)
Twin Cities Campus
Supply Chain Management M.S.
Supply Chain & Operations
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
MS SCM Program
Carlson School of Management
University of Minnesota
321 19th Ave S, Suite 1-110
Minneapolis, MN 55455
Phone: 612-625-5555
Email: msscm@umn.edu
Website: https://carlsonschool.umn.edu/degrees/master-science-in-supply-chain-management

- Program Type: Master’s
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The one-year, 32-credit MS degree in supply chain management will provide students with an end-to-end view of supply chain and will develop both their strategic and analytical capabilities needed to manage supply chains. The hallmarks of this MS degree will include leadership development as a programmatic theme, global immersion, corporate social responsibility and the flexibility to focus on supply chain management in specific industry sectors that are foundational to the economy of the State of Minnesota such as health care and medical devices, food and agribusiness, and retail.

Accreditation
This program is accredited by AACSB International. The M.S. in Supply Chain Management is STEM designated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor’s degree from an accredited college or university.

Other requirements to be completed before admission:
A minimum of 3 years of full-time professional work experience is required (internships not included) at the time of application submission.

Special Application Requirements:
Applicants must submit all application materials through the University’s admissions system. Application materials include:
- Online application & application fee.
- Transcripts from all colleges/universities previously attended. Non-English transcripts must be accompanied by an English translation.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (iETS).
- Two letters of recommendations need to be submitted through the online application.
- A personal statement (750 words / 2 pages maximum) answering the following questions: (1) Briefly describe your short-term and long-term career goals. Why are you choosing to pursue an MS SCM program at this time in your career, and what are you hoping to accomplish by doing so? (2) Why are you interested in pursuing an MS SCM program at the Carlson School of Management? (3) What do you feel makes you a strong candidate for the program? How will you contribute to the MS SCM program overall? (4) Any other academic weaknesses or concerns. Reflect on your prior academic performance and
make a case for why you are now prepared for the rigor of graduate level work.
- Applicants may choose to submit an essay to comment on any item(s) in their application they consider worthy of further explanation.
- Admissions interview (by invitation only).
- Video essay.
For admissions details, please visit https://carlsonschool.umn.edu/degrees/master-science-in-supply-chain-management/adm

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 32 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Bring all of the knowledge, skills, and tools developed in the MS SCM program to bear on an impactful global supply chain project for an external client. The objective for this course is to teach critical thinking and analysis skills in a global operations context. Students will conduct a fact-based analysis of a global supply chain issue for an external client. This course increases student understanding of the strategic nature of decision making in the supply chain field, and allows students to apply such thinking to the design and improvement of global supply chain networks. The course emphasizes critical thinking, communication, teamwork, and client management skills. Students will conduct primary and secondary research in order to develop a set of meaningful recommendations for a client on a global supply chain issue.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Core Courses: Fall (12 credits)
SCO 6048 - Logistics and Transportation (2.0 cr)
SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
SCO 6185 - Statistics (2.0 cr)
SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)
SCO 6285 - Managing Supply Chain Operations (4.0 cr)

Core Courses: Spring (8 credits)
SCO 6045 - Strategic Sourcing (2.0 cr)
SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
SCO 6094 - Responsible Supply Chain Management (2.0 cr)
SCO 6192 - Supply Chain Finance (2.0 cr)

Core Courses: Summer (6 credits)
SCO 6085 - Sales, Inventory, and Operations Planning (2.0 cr)
SCO 6292 - Global Operations Capstone (4.0 cr)

Core Course: Leadership Development - All Year (Fall, Spring and Summer) (2 credits)
SCO 6291 - Leadership Development (0.0 - 2.0 cr)

Spring Electives (4 credits)
APEC 5831 - Food and Agribusiness Marketplace (2.0 - 3.0 cr)
MGMT 6004 - Negotiation Strategies (2.0 cr)
MGMT 6084 - Management of Teams (2.0 cr)
SCO 6041 - Project Management (2.0 cr)
SCO 6091 - Process Improvement Methods (2.0 cr)
SCO 6092 - Supply Chain Risk and Security (2.0 cr)
SCO 6093 - Negotiations in Supply Chain (2.0 cr)
SCO 6095 - Supply Chain Management in the Food and Agribusiness Sector (2.0 cr)
SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
SCO 6097 - Supply Chain Management in the Retail Sector (2.0 cr)
Twin Cities Campus
Tax Executive Postbaccalaureate Certificate
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455. Phone: 612-624-7511.
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/degrees/master-business-taxation

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Tax Executive Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Tax Executive certificate is designed primarily for tax professionals working in tax departments of large corporations. It prepares graduates for greater responsibilities within their tax department. A rigorous curriculum, taught online by top faculty in the tax community, focuses on the analytical, problem solving, writing, and communication skills that foster career advancement. The certificate can be completed in 12 to 24 months, with breaks from early March through April 15 to accommodate schedules during peak tax season.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Required prerequisites
Introduction to Financial Reporting
ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course taken at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University's admission system.

For additional application details, review the MBT admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

**Required Courses (12 credits)**
Take the following courses:
- MBT 6231 - Corporate Taxation I (2.0 cr)
- MBT 6346 - ASC 740 Computations and Analysis (2.0 cr)
- MBT 6347 - Tax Technology and Analytics Fundamentals (2.0 cr)
- MBT 6348 - Advanced ASC 740 Concepts (2.0 cr)
- MBT 6361 - State and Local Taxation (2.0 cr)
- MBT 6381 - Tax Aspects of International Business I (2.0 cr)
Twin Cities Campus
Taxation Postbaccalaureate Certificate
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Ave South, Minneapolis, MN 55455; phone 612-624-7511
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/degrees/master-business-taxation

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Taxation Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Certificate in Taxation is designed for tax professionals seeking a credential that identifies them as an expert in the field while preparing graduates for greater responsibilities in business management and consulting. A rigorous curriculum, taught online by top faculty in the tax community, focuses on the analytical, problem solving, writing, and communication skills that foster career advancement. The certificate can be completed in 12 to 24 months, with breaks from early March through April 15 to accommodate schedules during peak tax season.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Required prerequisites
Introduction to Financial Reporting
ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course taken at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University's admission system.

For additional application details, review the MBT admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses (10 credits)
Take the following courses:
- MBT 6201 - Tax Accounting Methods I (2.0 cr)
- MBT 6221 - Tax Research, Communication, and Practice (4.0 cr)
- MBT 6231 - Corporate Taxation I (2.0 cr)
- MBT 6341 - Taxation of Partners and Partnerships (2.0 cr)

Elective Course (2 credits)
Select one of the following courses to meet the 12-credit requirement:
- MBT 6202 - Tax Accounting Methods II (2.0 cr)
- MBT 6226 - Negotiation Techniques in Taxation (2.0 cr)
- MBT 6232 - Corporate Taxation II (2.0 cr)
- MBT 6333 - Tax Aspects of Consolidated Returns (2.0 cr)
- MBT 6335 - Taxation of the Small Business Corporation (2.0 cr)
- MBT 6346 - ASC 740 Computations and Analysis (2.0 cr)
- MBT 6347 - Tax Technology and Analytics Fundamentals (2.0 cr)
- MBT 6351 - Wealth Transfer I (Estates and Gifts) (2.0 cr)
- MBT 6353 - Income Taxation of Fiduciaries (2.0 cr)
- MBT 6361 - State and Local Taxation (2.0 cr)
- MBT 6363 - Compensation and Benefits (2.0 cr)
- MBT 6371 - Taxation of Property Transactions (2.0 cr)
- MBT 6381 - Tax Aspects of International Business I (2.0 cr)
- MBT 6383 - Transfer Pricing (2.0 cr)
- MBT 6501 - Business, Government, and Economic Tax Policy (2.0 cr)
Twin Cities Campus

Biochemistry, Molecular Biology and Biophysics M.S.

Biochemistry, Molecular Biology, & Biophysics TCBS
Graduate School

Link to a list of faculty for this program.

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics
6-155 Jackson Hall
321 Church St. SE
Minneapolis, MN 55455
612-625-6100
Email: bmbbgp@umn.edu
Website: http://cbs.umn.edu/academics/departments/bmbb/graduate-program/about-graduate-program

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The biochemistry, molecular biology and biophysics (BMBB) graduate program is an interdisciplinary program that is supported by the College of Biological Sciences (CBS) and the Medical School of the University of Minnesota. The program provides a broad research-based education involving faculty from BMBB, as well as many faculty members from several other departments in CBS, the Medical School, the College of Science and Engineering (CSE), the College of Food, Agricultural and Natural Resources Sciences (CFANS), and the College of Veterinary Medicine.

BMBB focuses on determining the molecular mechanisms that underlie basic biological functions using an integrated approach that encompasses biochemistry, chemistry, biophysics, genomics, molecular biology, proteomics, and structural biology. Special emphasis is placed on revealing how biological processes go awry in diseases including cancer, diabetes, heart disease, and AIDS. The program has four areas of emphasis: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, and chemical and structural biology. All students are expected to demonstrate a minimum level of competence in these areas, but will emphasize the area most related to their thesis project.

While graduate training in a BMBB laboratory involves first-year coursework and associated preliminary examinations, the focal point for graduate education is thesis research. Laboratory-based exploration coupled with journal clubs, seminars, scientific meetings and retreats, career counseling, and scientific ethics constitutes the major components of the program. Support for graduate education comes from a variety of sources but is augmented by several NIH and NSF-based training grants. Most graduate students from the University of Minnesota obtain full-time employment immediately after graduation or pursue advanced training in academic or corporate positions.

Students pursuing a degree in BMBB are only admitted to the PhD program (see note below) under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first-year program administered by BMBB and the Molecular, Cellular, Developmental Biology and Genetics (MCDB&G) graduate programs. After the first year, students select either BMBB or MCDB&G to complete their degree.

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the master's of biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the master's in microbial engineering (http://biti.umn.edu/MicE/).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program can accommodate for a variety of educational backgrounds. However, applications from students with an undergraduate degree in the biological, chemical, or physical sciences are encouraged.

The program can accommodate for a variety of educational backgrounds. However, applications from students with an advanced
degree in the biological, chemical, or physical sciences are encouraged.

Other requirements to be completed before admission:
Recommended academic preparation includes one year each of calculus, organic chemistry, and basic biology, including biochemistry and genetics. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study.

Successful applicants must have previous research experience in an academic or industrial setting, in addition to any course-related laboratory experiences. It is important to demonstrate familiarity, with an aptitude for basic science research prior to embarking on a graduate career in this program.

***Note: Students are admitted only to the PhD program for BMBB (see additional note below).

Special Application Requirements:
Additionally, applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required.

The deadline to submit a completed application is December 1. Completed files are reviewed between January and February. Graduate studies begin fall semester only.

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the Master of Biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the Master in Microbial Engineering (http://bti.umn.edu/MicE/).

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
- **IELTS**
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

All students are expected to participate in seminars involving student reports on current literature and research.

**Biochemistry Core (1 Credit)**
Take the following core course for 1 credit:
- **BIOC 8401** - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)

**Laboratory and Field Course (1 Credit)**
Take MCDG 8920 for at least 1 credit. In August of the first year, BMBB students must register for this hands-on, intensive lab course that takes place at the Itasca Biological Station and Laboratories, which provides first-year students with exposure to a range of modern methods and model systems.
- **MCDG 8920** - Special Topics (1.0 - 4.0 cr)

**Module Options (6 Credits)**
Complete 6 credits in consultation with the director of graduate studies.
- **BIOC 5535** - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)
- **BIOC 5536** - Introduction to Modern Structural Biology - Nuclear Magnetic Resonance (2.0 cr)
- **BIOC 8005** - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)

Electives (12 Credits)
Take 12 credits of coursework in one of the four BMBB emphases: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, or chemical and structural biology. Courses from disciplines other than BMBB, in consultation with the advisor, may be used to build an emphasis.
BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)
BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5444 - Muscle (3.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOC 8084 - Research and Literature Reports (1.0 cr)
BIOC 8184 - Graduate Seminar (1.0 cr)
BIOC 8100 - Improvisation for Scientists (1.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEM 8735 - Bioinorganic Chemistry (4.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
GCD 5005 - Computer Programming for Biology (3.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8010 - Microbial Pathogenesis (3.0 cr)
MICA 8013 - Translational Cancer Research (2.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHBH 6450 - Biostatistics I (4.0 cr)
PHBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Thesis Credits
Take at least 10 master's thesis credits.
BIOC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Biochemistry, Molecular Biology and Biophysics Minor

Biochemistry, Molecular Biology, & Biophysics TCBS
Graduate School

Link to a list of faculty for this program.

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics
6-155 Jackson Hall
321 Church St. SE
Minneapolis, MN 55455
612-625-6100
Email: bmbbgp@umn.edu
Website: http://cbs.umn.edu/academics/departments/bmbb/graduate-program/about-graduate-program

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The biochemistry, molecular biology and biophysics (BMBB) program is an interdisciplinary program that is supported by the College of Biological Sciences (CBS) and the Medical School of the University of Minnesota. The program provides a broad research-based education involving faculty from BMBB as well as many faculty members from several other departments in CBS, the Medical School, the College of Science and Engineering (CSE), the College of Food, Agricultural and Natural Resources Sciences (CFANS), and the College of Veterinary Medicine.

BMBB focuses on determining the molecular mechanisms that underlie basic biological functions using an integrated approach that encompasses biochemistry, chemistry, biophysics, genomics, molecular biology, proteomics, and structural biology. Special emphasis is placed on revealing how biological processes go awry in diseases including cancer, diabetes, heart disease, and AIDS. The program has four areas of emphasis: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, and chemical and structural biology. All students are expected to demonstrate a minimum level of competence in these areas, but will emphasize the area most related to their thesis project.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses (6 Credits)
Select at least six credits of BMBB coursework, chosen in consultation with the BMBB director of graduate studies. In extenuating cases, an alternative course may be substituted with the approval of the director of graduate studies.
BIOC 5xxx
BIOC 6xxx
BIOC 7xxx
BIOC 8xxx

Doctoral
Module Options (6 Credits)
Take at least 6 credits from the following, in consultation with the BMBB director of graduate studies.
BIOC 5535 - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)
BIOC 5536 - Introduction to Modern Structural Biology - Nuclear Magnetic Resonance (2.0 cr)
BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)
BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)

Biochemistry Electives (6 Credits)
Take at least six credits, chosen in consultation with the BMBB director of graduate studies, to complete the 12-credit requirement. In extenuating cases, an alternative course may be substituted with the approval of the director of graduate studies.
BIOC 5xxx
BIOC 6xxx
BIOC 7xxx
BIOC 8xxx
GCD 5036 - Molecular Cell Biology (3.0 cr)
Twin Cities Campus
Biochemistry, Molecular Biology and Biophysics Ph.D.
Biochemistry, Molecular Biology, & Biophysics TCBS
Graduate School

Link to a list of faculty for this program.

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics
6-155 Jackson Hall
321 Church St. SE
Minneapolis, MN 55455
612-625-6100
Email: bmbbgp@umn.edu
Website: http://cbs.umn.edu/academics/departments/bmbb/graduate-program/about-graduate-program

• Program Type: Doctorate
• Requirements for this program are current for Fall 2022
• Length of program in credits: 48
• This program requires summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biochemistry, Molecular Biology and Biophysics (BMBB) graduate program is an interdisciplinary program that is supported by the College of Biological Sciences (CBS) and the Medical School of the University of Minnesota. The program provides a broad research-based education involving faculty from BMBB as well as many faculty members from several other departments in CBS, the Medical School, the College of Science and Engineering (CSE), the College of Food, Agricultural and Natural Resources Sciences (CFANS), and the College of Veterinary Medicine.

BMBB focuses on determining the molecular mechanisms that underlie basic biological functions using an integrated approach that encompasses biochemistry, chemistry, biophysics, genomics, molecular biology, proteomics, and structural biology. Special emphasis is placed on revealing how biological processes go awry in diseases including cancer, diabetes, heart disease, and AIDS. The program has four areas of emphasis: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, and chemical and structural biology. All students are expected to demonstrate a minimum level of competence in these areas but will emphasize the area most related to their thesis project.

While graduate training in a BMBB laboratory involves first-year coursework and associated preliminary examinations, the focal point for graduate education is thesis research. Laboratory-based exploration coupled with journal clubs, seminars, scientific meetings and retreats, career counseling and scientific ethics constitutes the major components of the program. Support for graduate education comes from a variety of sources but is augmented by several NIH and NSF-based training grants. PhD graduates from the University of Minnesota obtain full-time employment immediately after graduation or pursue advanced training in academic or corporate postdoctoral positions.

Students pursuing the PhD are admitted to BMBB under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first year program administered by BMBB and the Molecular, Cellular, Developmental Biology and Genetics (MCDB&G) graduate programs. After the first year, students select either BMBB or MCDB&G to complete their degree.

Related PhD and MS programs in BMBB:

As a part of the BMBB program, graduate studies leading to a PhD degree may be pursued on the Duluth campus. A PhD in BMBB may also be obtained through the Combined MD-PhD program. Please visit the program website for more information (http://www.med.umn.edu/mdphd/index.htm).

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the master's of biological sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the master's in microbial engineering (http://bti.umn.edu/MicE/).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
Prerequisites for Admission
The program can accommodate for a variety of educational backgrounds. However, applications from students with an undergraduate degree in the biological, chemical, or physical sciences are encouraged.

The program can accommodate for a variety of educational backgrounds. However, applications from students with an advanced degree in the biological, chemical, or physical sciences are encouraged.

Other requirements to be completed before admission:
Recommended academic preparation includes one year each of calculus, organic chemistry, and basic biology, including biochemistry and genetics. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study. Successful applicants must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate an aptitude for basic science research prior to embarking on a graduate career in this program.

Special Application Requirements:
Additionally, applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, and a complete set of transcripts are required. The deadline to submit a completed application is December 1. Completed files are reviewed between January and February. Graduate studies begin fall semester only. Related Ph.D. and M.S. Programs in BMBB: As a part of the BMBB program, graduate studies leading to a PhD degree may be pursued on the Duluth Campus. A PhD in BMBB may also be obtained through the Combined MD-PhD Program. Please visit the program website for more information (http://www.med.umn.edu/mdphd/index.htm). Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the Master of Biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the Master in Microbial Engineering (http://bti.umn.edu/MicE/).
For an online application or for more information about graduate education admissions, see the General Information section of this website.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.00 is required for students to remain in good standing.
Students must complete three seminar presentations and two teaching assignments between years 2 and 4.
Students must register for BIOC 8084 and 8184 at least once during their first or second year in the program.

Biochemistry Required Coursework (12 Credits)
Core Courses (4 credits)
Complete the following core courses. MCDG 8920 must be taken for two credits.
- BIOC 5002 - Critical Evaluation of Biochemistry Research (1.0 cr)
- BIOC 8184 - Graduate Seminar (1.0 cr)
- MCDG 8920 - Special Topics (1.0 - 4.0 cr)
Student Seminar (1 credit)
BIOC 8084 - Research and Literature Reports (1.0 cr)

or

MCDG 8900 - Student Research Seminar (1.0 cr)

Ethics (1 credit)

BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)

or

GCD 8401 - Ethics, Public Policy & Careers in Molecular Cell Biology (1.0 cr)

Module Options (6 Credits)

Complete six credits, in consultation with the director of graduate studies, from the following list:

BIOC 5535 - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)

BIOC 5536 - Introduction to Modern Structural Biology - Nuclear Magnetic Resonance (2.0 cr)

BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)

BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)

BIOC 8007 - Molecular Biology of the Genome (2.0 cr)

BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)

Emphasis Electives (12 Credits)

Complete 12 credits of coursework, in consultation with the advisor, from one of the four BMBB emphases: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, or chemical and structural biology. Non-BMBB courses may be used to build an emphasis with advisor and director of graduate studies approval.

BIOC 5216 - Current Topics in Signal Transduction (2.0 cr)

BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)

BIOC 5351 - Protein Engineering (3.0 cr)

BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)

BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)

BIOC 5444 - Muscle (3.0 cr)

BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)

BIOC 8084 - Research and Literature Reports (1.0 cr)

BIOC 8184 - Graduate Seminar (1.0 cr)

BIOL 8100 - Improvisation for Scientists (1.0 cr)

CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)

CHEM 8021 - Computational Chemistry (4.0 cr)

CHEM 8411 - Introduction to Chemical Biology (4.0 cr)

CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)

CHEM 8735 - Bioinorganic Chemistry (4.0 cr)

CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)

CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)

GCD 5005 - Computer Programming for Biology (3.0 cr)

GCD 8008 - Research and Literature Reports (1.0 cr)

GCD 8184 - Graduate Seminar (1.0 cr)

GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)

GCD 8900 - Seminar (1.0 - 2.0 cr)

GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)

GRAD 8101 - Teaching in Higher Education (3.0 cr)

GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)

MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)

MICA 8003 - Immunity and Immunopathology (4.0 cr)

MICA 8004 - Cellular and Cancer Biology (4.0 cr)

MICA 8010 - Microbial Pathogenesis (3.0 cr)

MICA 8013 - Translational Cancer Research (2.0 cr)

PHCL 5111 - Pharmacogenomics (3.0 cr)

PUBH 6450 - Biostatistics I (4.0 cr)

PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)

SCB 8181 - Stem Cell Biology (3.0 cr)

STAT 5021 - Statistical Analysis (4.0 cr)

Thesis Credits

Take 24 doctoral thesis credits.

BIOC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework: MD/PhD-Biochemistry, Molecular Biology and Biophysics
Student may take a total of 18 credits in common among the academic programs.
**Twin Cities Campus**

**Bioethics M.A.**

*Bioethics, Center for Graduate School*

Link to a list of faculty for this program.

**Contact Information:**
Center for Bioethics, University of Minnesota, Suite N504 Boynton, 410 Church Street SE, Minneapolis, MN 55455 (612-624-9440)
Email: bthxed@umn.edu
Website: [http://www.bioethics.umn.edu/education/master-arts-bioethics](http://www.bioethics.umn.edu/education/master-arts-bioethics)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](http://www.bioethics.umn.edu/education/master-arts-bioethics) section of the catalog website for requirements that apply to all major fields.

Admissions for the Bioethics MA Program are currently on hold. Please contact bthxed@umn.edu for updates.

The Center for Bioethics offers two kinds of MA degrees: Plan A and Plan B with a major in bioethics. The curriculum for both Plan A and Plan B degrees includes a set of required core courses, bioethics electives, and a requirement for coursework in fields related to bioethics. The Plan A culminates in a substantial, 10-credit master's thesis. In lieu of a thesis, the Plan B culminates in a 4-credit practicum, a 3-credit capstone project and final exam. Electives comprise the additional 3 credits in the Plan B degree.

Graduates of the MA in bioethics greatly enhance their professional opportunities in the field when they combine their bioethics degree with a terminal graduate or professional degree in another field. Examples of degree combinations can include an MA degree in bioethics with a JD, PhD, MD, nursing, or others. This model of pairing the MA in bioethics with another degree prompts students to acquire a firm disciplinary grounding as well as interdisciplinary bioethics expertise, a practice which best prepares students for the interdisciplinary career options related to bioethics. Some examples of careers include work in the fields of genetics, social work, public health, veterinary science, religious studies, psychology, biology, and philosophy.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree is required for admission.

**Special Application Requirements:**

This program is not accepting applications for new students at this time.

Transcripts of all postsecondary academic work, a personal statement, a writing sample (preferably on a topic in bioethics), a description of research or relevant work experience, a C.V. or résumé, and at least three letters of reference are required. Applicants may also submit a statement on "Extenuating Circumstances" and "Diversity." See program website for more details.

Students are admitted to the Bioethics M.A. program for fall semester only. Applications are accepted as early as the first day of fall semester prior to the proposed start of the student's M.A. program. Our primary deadline is March 1 with an extended deadline of May 1 if space in our program remains available.

Students are encouraged to link their degree in bioethics to a degree in a related field (either before entering the bioethics M.A. program or at the same time). Given the fundamentally interdisciplinary nature of bioethics, prospective students are advised against viewing the bioethics M.A. as a stand-alone degree that prepares them for career placement. This model prompts students to acquire a firm disciplinary grounding as well as interdisciplinary bioethics expertise—a practice that best prepares students for bioethics-related career placement. Thus, the admissions process will give preference to students who have already earned or are in the process of earning an advanced degree in a related field, although this will not strictly be required for admission.
Because our program recommends pairing the Bioethics degree with another graduate or professional degree, we recognize applicants may need to answer to another program prior to our deadline. If this is the case, please email bthxed@umn.edu with your concern.

Applicants must submit their test score(s) from the following:
- GRE
- MCAT
- LSAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (GRE, MCAT, LSAT, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 21 major credits and 9 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Students will design and undertake a project and its corollary product relevant to their interests, experience, and intended use of the MA in bioethics. The experiential component is designed to be flexible, allowing the student to undertake an internship, shadow physicians or other health care personnel, or use their own work experience when relevant to cater a project to their intended goals. Rigor is maintained through committee oversight, nature of the experience, and number of hours undertaken.

Products are also designed to be flexible while retaining rigor, innovation, and written analysis. Original research is not required (as with a thesis), but a thorough literature review and accompanying overview or synthesis of the arena of which the project is a part is necessary, as is a thorough explanation of the final product. Full committee approval of the final product before the project is undertaken is required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Core Courses (6 credits)
- BTHX 5010 - Bioethics Proseminar (2.0 cr)
- BTHX 5300 - Foundations of Bioethics (3.0 cr)
- BTHX 5610 - Research & Publication Seminar (1.0 cr)
  or BTHX 5630 - Bioethics Colloquium (1.0 cr)

Bioethic Electives (8)
Select at least 8 credits of BTHX courses in consultation with the advisor.
- BTHX 5xxx
- BTHX 6xxx
- BTHX 7xxx
- BTHX 8xxx

Related Fields Electives (6-9 credits)
Plan A students take at least 6 credits and Plan B students take at least 9 credits of elective credits from outside Bioethics.

Joint- or Dual-degree Coursework: Joint Degree Program in Law, Health, and the Life Sciences Student may take a total of 11 credits in common among the academic programs.
Twin Cities Campus
Bioethics Minor
Bioethics, Center for
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Bioethics, University of Minnesota, N504 Boynton, 410 Church Street SE, Minneapolis, MN 55455 (612-624-9440)
Email: bthxed@umn.edu
Website: http://www.bioethics.umn.edu/education/graduate-minor-bioethics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Bioethics minor is designed to deepen students knowledge of the ethical issues surrounding health and the life sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students pursuing the JD, MD, PharmD, DVM, DDS, or LLM degree are not eligible for the minor.

Eligible students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Bioethics director of graduate studies regarding feasibility and requirements.

Acceptance into the Bioethics minor requires pre-approval by the Bioethics director of graduate studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be chosen in consultation with the bioethics director of graduate studies.

Philosophy students are expected to have successfully completed at least one course in ethical theory at the 5xxx or 8xxx level prior to undertaking coursework in the minor.

Students must complete the minor with a 3.00 GPA.

Coursework Requirements
Required Courses (2 credits)
Select 1 of the following courses in consultation with the Bioethics director of graduate studies:
BTHX 5010 - Bioethics Proseminar (2.0 cr)
or BTHX 5325 - Biomedical Ethics (3.0 cr)

Electives (6 to 12 credits)
Masters students select at least 6 credits and doctoral students select at least 12 credits from the following, in consultation with the Bioethics director of graduate studies, to meet minimum credit requirements. Other elective courses may be chosen with approval of the Bioethics director of graduate studies.
BTHX 5000 - Topics in Bioethics (1.0 - 4.0 cr)
BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
BTHX 5110 - Ethical Issues in Pediatrics (2.0 cr)
BTHX 5120 - Dying in Contemporary Medical Culture (2.0 cr)
BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
BTHX 5400 - Intro Ethics in Hlth Policy (3.0 cr)
BTHX 5411 - Health Law and Policy (3.0 cr)
BTHX 5453 - Law, Biomedicine, and Bioethics (3.0 cr)
BTHX 5510 - Gender and the Politics of Health (3.0 cr)
BTHX 5520 - Social Justice and Bioethics (3.0 cr)
BTHX 5540 - Bioethics, Psychiatry & Psychology (3.0 cr)
BTHX 5610 - Research & Publication Seminar (1.0 cr)
BTHX 5620 - Social Context of Health and Illness (3.0 cr)
BTHX 5630 - Bioethics Colloquium (1.0 cr)
BTHX 5650 - Disability Ethics (3.0 cr)
BTHX 5900 - Independent Study in Bioethics (1.0 - 4.0 cr)
BTHX 8000 - Advanced Topics in Bioethics (1.0 - 4.0 cr)
BTHX 8114 - Ethical and legal Issues in Genetic Counseling (2.0 cr)
BTHX 8120 - Dying in Contemporary Medical Culture (2.0 cr)
BTHX 8500 - Practicum in Bioethics (1.0 - 4.0 cr)
BTHX 8510 - Gender and the Politics of Health (3.0 cr)
BTHX 8520 - Social Justice and Bioethics (3.0 cr)
BTHX 8610 - Medical Consumerism (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Clinical Ethics Postbaccalaureate Certificate
Bioethics, Center for
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Bioethics
N504 Boynton
410 Church St SE
Minneapolis, MN 55455
Email: bthxed@umn.edu
Website: http://www.bioethics.umn.edu/education/clinical-ethics-certificate-program

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Clinical Ethics PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Admissions to the clinical ethics post-baccalaureate certificate are currently on hold. Please contact bthxed@umn.edu for updates.

The clinical ethics post-baccalaureate certificate will offer a graduate level educational opportunity for practicing professionals including physicians, nurses, social workers, chaplains, and others. Students will engage in classwork and practical experience geared toward mastery of the knowledge and skills needed for work in clinical ethics, including participation on ethics committees, clinical ethics consultation services, institutional and regional clinical ethics policy bodies, such as organ allocation committees or brain death committees, support for institutional staff development programs in their professional fields, or simply being better prepared to meet the ethical challenges that arise in their work. The curriculum will fulfill the health care ethics core competencies promulgated by the American Society for Bioethics and Humanities.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A graduate or professional degree in a field related to clinical ethics is required for admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Courses (13 credits)
NB: BTHX 8500 will be taken twice, 2 cr each time, once fall once spring.
BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
BTHX 5110 Ethical Issues in Pediatrics (2.0 cr)
BTHX 5120 Dying in Contemporary Medical Culture (2.0 cr)
BTHX 8100 Advanced Theory and Practice of Clinical Ethics (2.0 cr)
BTHX 8500 - Practicum in Bioethics (1.0 - 4.0 cr)
Twin Cities Campus
Health Care Design and Innovation Postbaccalaureate Certificate
School of Nursing
Graduate School

Link to a list of faculty for this program.

Contact Information:
Densford International Center for Nursing Leadership, University of Minnesota School of Nursing, 4-185 Weaver-Densford Hall, 308 Harvard St SE, Minneapolis, MN 55455 (612-625-1187; fax: 612-624-0908)
Email: gophernursing@umn.edu
Website: https://nursing.umn.edu/academics/certificates

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Health Care Design & Innovation PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in health care design and innovation prepares health care and design practitioners to create optimal healing environments. Students learn how to apply design thinking in creating new processes, systems, and care environments. The certificate emphasizes principles that promote healing and safe patient care while maximizing clinical and financial outcomes.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the certificate program requires a baccalaureate degree from an accredited institution in a health-related field, interior design, architecture, or other design-related area.

Other requirements to be completed before admission:
Applicants are required to submit transcripts from all institutions where postsecondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, one essay, a current curriculum vitae/resume, and English language proficiency scores (if applicable). This certificate has two application deadlines: November 1 for spring admission and July 1 for fall admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Required Courses
CSPH 5711 - Optimal Healing Environments (3.0 cr)
NURS 7610 - System Leadership and Innovation (3.0 cr)
HUMF 5874 - Human Centered Design to Improve Complex Systems (4.0 cr)
NURS 6707 - Health Care Design and Innovation Practicum (2.0 cr)
Twin Cities Campus
Health Informatics M.H.I.  
Health Informatics, AHC Inst  
Graduate School

Link to a [list of faculty] for this program.

Contact Information:
Physical Address: 8-100 PWB, 516 Delaware St. SE, Minneapolis, MN 55455  
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455  
612-626-3348  
Email: ihi@umn.edu  
Website: [http://healthinformatics.umn.edu](http://healthinformatics.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2022  
- Length of program in credits: 31  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Health Informatics

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Health informatics (also known as biomedical informatics) is an interdisciplinary field of scholarship that applies computer, information, statistical, management, and related scientific methods to enable biomedical discovery and support the effective and efficient use and analysis of data, management of information, and application of knowledge across the spectrum from basic science to clinical care. The ultimate goal of the field is to improve the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics and take electives in technical and health science areas.

### Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

### Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants are expected to have at least a bachelor's degree or equivalent degree from a regionally accredited institution of higher education or an international equivalent.

**Required prerequisites**

**Health or Biological Sciences**
Applicants must have taken 6 semester-credits or 9 quarter-credits at the undergraduate or graduate level in medical, life, or biological sciences from a regionally accredited institution of higher learning or equivalent. This broadly defined requirement includes most courses with a health or biology emphasis, including biostatistics, health services research, and public health, as well as more traditional biology or life science courses.

**Programming Language**
Documented work or educational experience working with a programming language such as C, C++, Java, Python, R, Visual Basic, etc.
- or [HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)](http://example.com)
- or Department Consent

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 151
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 31 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The capstone project is a 3- or 4-credit course in which students apply their newly acquired knowledge and skills to a project involving a practical problem in health informatics. Students learn how to design these projects properly through review of past exemplary projects. With the help of their advisors and the capstone course director, students design and carry out their own projects, which can take a variety of forms, including developing design and evaluation specifications for software to address a specific healthcare need; working on, observing, analyzing, and reporting the actions of a team involved in implementing a new information system; or observing and measuring the impact of such a system in a healthcare setting. Students submit a written project report, graded by the capstone project instructor and the student's advisor, in lieu of a final examination.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

HINF Courses (15 credits)
Take the following courses:
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)

Other Required Courses (6 credits)
Take the following courses:
NURS 7108 - Population Health Informatics (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)

Final Project (3 credits)
MHI students take HINF 5499 (3 credits). Students pursuing the joint MD/MHI take LAMP 7195 (4 credits).
HINF 5499 - Capstone Project for the Masters of Health Informatics (3.0 cr)
or LAMP 7195 - Medical Informatics (4.0 cr)

Electives
Take electives as needed to meet the 31-credit minimum. If labs or practicums are selected as electives, they must be taken concurrently with the associated course (i.e. take HINF 8430 with HINF 5430). Electives must be approved by the advisor.
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
CSCI 5106 - Programming Languages (3.0 cr)
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
DES 5185 - Human Factors in Design (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
GCD 8103 - Human Histology (5.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
HINF 5494 - Topics in Health Informatics (1.0 - 3.0 cr)
HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5630 - Clinical Data Mining (3.0 cr)
HINF 5640 - Advanced Translational Bioinformatics Methods (3.0 cr)
HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
HINF 8220 - Computational Causal Analytics (3.0 cr)
HINF 8245 - Advanced Topics in Health Informatics I (1.0 - 4.0 cr)
HINF 8246 - Advanced Topics in Health Informatics II (1.0 - 4.0 cr)
HINF 8247 - Foundations of Health Informatics I Lab (2.0 cr)
HINF 8248 - Foundations of Health Informatics II Lab (2.0 cr)
HINF 8249 - Foundations of Translational Bioinformatics Lab (2.0 cr)
HINF 8252 - Advanced Readings or Research in Health Informatics (1.0 - 6.0 cr)
HINF 8255 - Health Informatics Teaching (2.0 cr)
HINF 8256 - Advanced Health Informatics Research Methods (3.0 cr)
IDSC 6041 - Information Technology Management (2.0 cr)
IDSC 6051 - Information Technologies and Solutions (2.0 cr)
IDSC 6471 - Knowledge Management (2.0 cr)
IDSC 8721 - Behavioral Decision Theory (3.0 cr)
IE 8521 - Optimization (4.0 cr)
IE 8531 - Discrete Optimization (4.0 cr)
KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
LING 5001 - Introduction to Linguistics (4.0 cr)
LING 5025 - Semantics (3.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MEDC 5245 - Introduction to Drug Design (3.0 cr)
MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
NURS 5117 - Consumer Health Informatics Practicum (2.0 cr)
NURS 6105 - Systems Analysis and Design (3.0 cr)
NURS 7103 - Knowledge Representation and Interoperability Practicum (2.0 cr)
NURS 7109 - Population Health Informatics Practicum (2.0 cr)
NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
NURS 7114 - Clinical Decision Support Practicum (2.0 cr)
NURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
NURS 7610 - System Leadership and Innovation (3.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PUBLIC 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
PUBLIC 6102 - Issues in Environmental Health (2.0 cr)
PUBLIC 6131 - Working in Global Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 6555 - Health Economics (2.0 cr)
PUBH 6556 - Health and Health Systems (3.0 cr)
PUBH 6557 - Health Finance I (3.0 cr)
PUBH 6558 - Health Finance II (3.0 cr)
PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
PUBH 6562 - Information Technology in Health Care (2.0 cr)
PUBH 6564 - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
PUBH 6780 - Topics in Public Health Administration and Policy (1.0 - 3.0 cr)
PUBH 6800 - Topics: Health Services Research and Policy (0.5 - 4.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 7400 - Topics: Biostatistics (0.5 - 4.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7407 - Analysis of Categorical Data (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7460 - Advanced Statistical Computing (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7588 - Information Uses in Long-Term Care (2.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
PUBH 8462 - Advanced Survival Analysis (3.0 cr)
PUBH 8472 - Spatial Biostatistics (3.0 cr)
PUBH 8801 - Health Services Policy Analysis: Theory (1.0 cr)
PUBH 8810 - Research Studies in Health Care (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5511 - Time Series Analysis (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)

Joint- or Dual-degree Coursework: MD/MHI program Student may take a total of 3 credits in common among the academic programs.
Twin Cities Campus
Health Informatics M.S.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 8-100 PWB, 516 Delaware St. SE, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ihi@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics (also known as biomedical informatics) is an interdisciplinary field of scholarship that applies computer, information, statistical, management, and related scientific methods to enable biomedical discovery and support the effective and efficient use and analysis of data, management of information, and application of knowledge across the spectrum from basic science to clinical care. The ultimate goal of the field is to improve the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics, computing, and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

The health informatics MS is intended for students who are interested in research, but who do not have the background or are not ready to commit to the PhD program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.30.

Applicants are expected to have at least a bachelor of science or equivalent degree from a regionally accredited institution of higher education.

Required prerequisites

Health or Biological Sciences
Applicants must have taken 6 semester-credits or 9 quarter-credits at the undergraduate or graduate level in medical, life, or biological sciences from a regionally accredited institution of higher learning or equivalent. This broadly defined requirement includes most courses with a health or biology emphasis, including biostatistics, health services research, and public health, as well as more traditional biology or life science courses.

Programming Language
Documented work or educational experience working with a programming language such as C, C++, Java, Python, R, Visual Basic, etc.
or HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
or Department Consent

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 151
  - General Test - Quantitative Reasoning: 160
  - General Test - Analytical Writing: 4
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 26 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 36 major credits and up to null credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required HINF Courses (16 credits)**

Take the following courses. Take HINF 5436 twice for a total of 2 credits.

- **HINF 5430** - Foundations of Health Informatics I (3.0 cr)
- **HINF 5431** - Foundations of Health Informatics II (3.0 cr)
- **HINF 5436** - AHC Informatics Grand Rounds (1.0 cr)
- **HINF 5510** - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- **HINF 5520** - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
- **HINF 5531** - Health Data Analytics and Data Science (3.0 cr)

**Other Required Courses (7 credits)**

Take the following courses:

- **NURS 7108** - Population Health Informatics (2.0 cr)
- **PUBH 6450** - Biostatistics I (4.0 cr)

**Electives (3 to 9 credits)**

Plan A students select 3 credits, and Plan B students select 9 credits from the following. If labs or practicums are selected, they must be taken concurrently with the associated course (e.g., HINF 8430 must be taken with HINF 5430). Advisor approval is required.

- **BIOC 5361** - Microbial Genomics and Bioinformatics (3.0 cr)
- **BIOC 8007** - Molecular Biology of the Genome (2.0 cr)
- **BIOC 8008** - Molecular Biology of the Transcriptome (2.0 cr)
- **CGSC 8410** - Perspectives in Learning, Perception, and Cognition (2.0 cr)
- **CSCI 5106** - Programming Languages (3.0 cr)
- **CSCI 5115** - User Interface Design, Implementation and Evaluation (3.0 cr)
- **CSCI 5271** - Introduction to Computer Security (3.0 cr)
- **CSCI 5421** - Advanced Algorithms and Data Structures (3.0 cr)
- **CSCI 5461** - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- **CSCI 5481** - Computational Techniques for Genomics (3.0 cr)
- **CSCI 5511** - Artificial Intelligence I (3.0 cr)
- **CSCI 5521** - Machine Learning Fundamentals (3.0 cr)
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSCI 5525</td>
<td>Machine Learning: Analysis and Methods</td>
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<tr>
<td>CSCI 5607</td>
<td>Fundamentals of Computer Graphics I</td>
<td>3.0 cr</td>
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<tr>
<td>CSCI 5608</td>
<td>Fundamentals of Computer Graphics II</td>
<td>3.0 cr</td>
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<td>CSCI 5707</td>
<td>Principles of Database Systems</td>
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<td>CSCI 5708</td>
<td>Architecture and Implementation of Database Management Systems</td>
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<td>CSCI 5801</td>
<td>Software Engineering I</td>
<td>3.0 cr</td>
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<td>CSCI 8725</td>
<td>Databases for Bioinformatics</td>
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<td>Human Factors in Design</td>
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<td>EPSY 5244</td>
<td>Survey Design, Sampling, and Implementation</td>
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<td>EPSY 5262</td>
<td>Intermediate Statistical Methods</td>
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<td>GCD 8103</td>
<td>Human Histology</td>
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<td>HINF 5440</td>
<td>Foundations of Translational Bioinformatics</td>
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<td>HINF 5450</td>
<td>Foundations of Precision Medicine Informatics</td>
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<td>HINF 5494</td>
<td>Topics in Health Informatics</td>
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<td>HINF 5496</td>
<td>Internship in Health Informatics</td>
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<td>HINF 5497</td>
<td>Python Programming Essentials for the Health Sciences</td>
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<td>HINF 5610</td>
<td>Foundations of Biomedical Natural Language Processing</td>
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<td>HINF 5620</td>
<td>Data Visualization for the Health Sciences</td>
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<td>HINF 5630</td>
<td>Clinical Data Mining</td>
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<td>Advanced Translational Bioinformatics Methods</td>
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<td>Integrative Genomics and Computational Methods</td>
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<td>HINF 8220</td>
<td>Computational Causal Analytics</td>
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<td>HINF 8405</td>
<td>Advanced Topics in Health Informatics I</td>
<td>1.0 - 4.0 cr</td>
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<td>HINF 8406</td>
<td>Advanced Topics in Health Informatics II</td>
<td>1.0 - 4.0 cr</td>
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<td>Foundations of Health Informatics I Lab</td>
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<td>Foundations of Health Informatics II Lab</td>
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<td>HINF 8440</td>
<td>Foundations of Translational Bioinformatics Lab</td>
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<td>HINF 8492</td>
<td>Advanced Readings or Research in Health Informatics</td>
<td>1.0 - 6.0 cr</td>
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<td>HINF 8525</td>
<td>Health Informatics Teaching</td>
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<tr>
<td>HINF 8535</td>
<td>Advanced Health Informatics Research Methods</td>
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<td>IDSC 6041</td>
<td>Information Technology Management</td>
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<td>IDSC 6051</td>
<td>Information Technologies and Solutions</td>
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<td>IDSC 6471</td>
<td>Knowledge Management</td>
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<td>IDSC 8721</td>
<td>Behavioral Decision Theory</td>
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<td>IE 8521</td>
<td>Optimization</td>
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<td>IE 8531</td>
<td>Discrete Optimization</td>
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<td>KIN 5001</td>
<td>Foundations of Human Factors/Ergonomics</td>
<td>3.0 cr</td>
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<td>LING 5001</td>
<td>Introduction to Linguistics</td>
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<td>LING 5205</td>
<td>Semantics</td>
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<td>LING 5801</td>
<td>Introduction to Computational Linguistics</td>
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<td>MATH 5445</td>
<td>Mathematical Analysis of Biological Networks</td>
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<td>MATH 5467</td>
<td>Introduction to the Mathematics of Image and Data Analysis</td>
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<td>MATH 5652</td>
<td>Introduction to Stochastic Processes</td>
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<td>MEDC 5245</td>
<td>Introduction to Drug Design</td>
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<td>MILI 6992</td>
<td>Healthcare Delivery Innovations; Optimizing Cost and Quality</td>
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<td>MILI 6995</td>
<td>Medical Industry Valuation Laboratory</td>
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<td>NURS 5115</td>
<td>Interprofessional Health Care Informatics</td>
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<td>NURS 5117</td>
<td>Consumer Health Informatics</td>
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<td>NURS 6105</td>
<td>Systems Analysis and Design</td>
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<td>NURS 7106</td>
<td>Knowledge Representation and Interoperability Practicum</td>
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<td>NURS 7109</td>
<td>Population Health Informatics</td>
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<td>NURS 7113</td>
<td>Clinical Decision Support: Theory</td>
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<td>NURS 7114</td>
<td>Clinical Decision Support Practicum</td>
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<td>NURS 7118</td>
<td>Human Factors and Human-Computer Interaction in Health Informatics</td>
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<td>NURS 7610</td>
<td>System Leadership and Innovation</td>
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<td>PHAR 6224</td>
<td>Advanced Pharmacogenomics and Precision Medicine</td>
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<td>PUBH 6020</td>
<td>Fundamentals of Social and Behavioral Science</td>
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<td>PUBH 6102</td>
<td>Issues in Environmental Health</td>
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<td>PUBH 6131</td>
<td>Working in Global Health</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6320</td>
<td>Fundamentals of Epidemiology</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6325</td>
<td>Data Processing with PC-SAS</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 6341</td>
<td>Epidemiologic Methods I</td>
<td>3.0 cr</td>
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<td>PUBH 6386</td>
<td>Cardiovascular Disease Epidemiology and Prevention</td>
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<td>PUBH 6420</td>
<td>Introduction to SAS Programming</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 6541</td>
<td>Statistics for Health Management Decision Making</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6555</td>
<td>Health Economics</td>
<td>2.0 cr</td>
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</tbody>
</table>
Plan Options

Plan A
Take at least 10 master's thesis credits.
HINF 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Take the following course:
HINF 8770 - Plan B Project (4.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.
Twin Cities Campus
Health Informatics Minor
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 8-100 PWB, 516 Delaware St. SE, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ihl@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics (also known as biomedical informatics) is an interdisciplinary field of scholarship that applies computer, information, statistical, management, and related scientific methods to enable biomedical discovery and support the effective and efficient use and analysis of data, management of information, and application of knowledge across the spectrum from basic science to clinical care. The ultimate goal of the field is to improve the health, well-being, and economic functioning of society. The minor provides an opportunity for students to supplement their primary training with additional knowledge and skills in health informatics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Required prerequisites
Health or Biological Sciences
Applicants must have taken 6 semester-credits or 9 quarter-credits at the undergraduate or graduate level in medical, life, or biological sciences from a regionally accredited institution of higher learning or equivalent. This broadly defined requirement includes most courses with a health or biology emphasis, including biostatistics, health services research, and public health, as well as more traditional biology or life science courses.

Programming language
Documented work or educational experience working with a programming language such as C, C++, Java, Python, R, Visual Basic, etc.

or HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)

or Department Consent

Special Application Requirements:
Applicants must be earning a graduate-level degree from the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Coursework
All students pursuing the Health Informatics minor must complete the following course:
HINF 5430 - Foundations of Health Informatics I (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Course
Take the following course to complete the 6-credit minimum for the master's minor:
HINF 5431 - Foundations of Health Informatics II (3.0 cr)

Doctoral
Required courses
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)

Foundations Lab
Students must take at least one lab concurrently with the associated course (i.e. take 8430 concurrently with 5430 or 8440 concurrently with 5440).
Take 1 - 2 course(s) from the following:
• HINF 8430 - Foundations of Health Informatics I Lab (2.0 cr)
• HINF 8440 - Foundations of Translational Bioinformatics Lab (2.0 cr)

Electives
Take HINF electives to meet the 12-credit minimum for the doctoral minor.
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)
HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
HINF 5494 - Topics in Health Informatics (1.0 - 3.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5630 - Clinical Data Mining (3.0 cr)
HINF 5640 - Advanced Translational Bioinformatics Methods (3.0 cr)
HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
HINF 8220 - Computational Causal Analytics (3.0 cr)
HINF 8405 - Advanced Topics in Health Informatics I (1.0 - 4.0 cr)
HINF 8406 - Advanced Topics in Health Informatics II (1.0 - 4.0 cr)
HINF 8492 - Advanced Readings or Research in Health Informatics (1.0 - 6.0 cr)
Twin Cities Campus
Health Informatics Ph.D.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 8-100 PWB, 516 Delaware St. SE, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ihi@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics (also known as biomedical informatics) is an interdisciplinary field of scholarship that applies computer, information, statistical, management, and related scientific methods to enable biomedical discovery and support the effective and efficient use and analysis of data, management of information, and application of knowledge across the spectrum from basic science to clinical care. The ultimate goal of the field is to improve the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics, computing, and biostatistics, and electives in technical and health science areas, and pursue one of four tracks: data science and informatics for learning health systems; clinical informatics; translational bioinformatics; or precision and personalized medicine (PPM) informatics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a BS or equivalent in science, technology, engineering, computer science, math, or another pertinent field from a regionally accredited university or international equivalent.

Required prerequisites
Health or Biological Sciences
Applicants must have taken 6 semester-credits or 9 quarter-credits at the undergraduate or graduate level in medical, life, or biological sciences from a regionally accredited institution of higher learning or equivalent. This broadly defined requirement includes most courses with a health or biology emphasis, including biostatistics, health services research, and public health, as well as more traditional biology or life science courses.
6-9 credits

Computer Science
Clinical Informatics Track
Documented work or educational experience working with a general purpose programming language such as C, C++, Java, Visual Basic, PASCAL, etc.
or HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
or Other Tracks
Applicants to the data science for learning health systems, translational bioinformatics, and precision and personalized medicine informatics tracks must also have taken an introduction to data structures and algorithms, such as the course listed below.
CSCI 1933 - Introduction to Algorithms and Data Structures (4.0 cr)

Track-Specific Prerequisites
Applicants to the data science for learning health systems, translational bioinformatics, and precision and personalized medicine informatics tracks must also have the following prerequisites or must take remedial courses at the discretion of the admissions committee:
Mathematics
Applicants must have college-level calculus and linear algebra, such as the courses listed below.
MATH 1271 - Calculus I [MATH] (4.0 cr)
CSCI 2033 - Elementary Computational Linear Algebra (4.0 cr)
or MATH 4242 - Applied Linear Algebra (4.0 cr)

Statistics
Applicants must have college-level statistics, such as the courses below.
STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)
or STAT 3021 - Introduction to Probability and Statistics (3.0 cr)

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 151
  - General Test - Quantitative Reasoning: 160
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
46 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All courses taken, milestones met, and progress made in the program are subject to Academic Program Committee (APC) review. The inclusion of 4000-level coursework requires APC approval.

Required Core Coursework (14 credits)

Phase I (12 credits)
Take the following courses. Take HINF 5436 twice for a total of 2 credits.
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 8430 - Foundations of Health Informatics I Lab (2.0 cr)
HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 8440 - Foundations of Translational Bioinformatics Lab (2.0 cr)

Phase II (2 credits)
Take the following course, with APC approval, after completing Phase I coursework.
HINF 8525 - Health Informatics Teaching (2.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits in consultation with the APC.
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Clinical Informatics
The clinical informatics track provides instruction and training for students interested in clinical applications methods and applications. The curriculum includes instruction in health data and coding, systems analysis, human-computer interaction, current informatics research, and current applications such as decision support systems, natural language processing, and predictive modeling. Additionally, students learn biostatistical methods, relational database theory and practice, analytics and data science methodologies, consumer health informatics, and interprofessional practice. Electives supplement individual student interests in areas such as computer programming, health data management, health care finance, and public and population health (with scope to include person-empowered participation and inter-professional engagement). Courses use a mixture of theoretical and applied subject matter to provide a solid grounding in current informatics thinking and practice.

Clinical Informatics Coursework (32 credits)
Core Coursework (16 credits)
Take the following core courses:
- HINF 5431 - Foundations of Health Informatics II (3.0 cr)
- HINF 8431 - Foundations of Health Informatics II Lab (2.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
- NURS 5116 - Consumer Health Informatics (2.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)

Required Biostatistics Coursework (8 credits)
Take the following two courses:
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

Electives
Select at least 8 elective credits, in consultation with the APC, to complete the 46 course credits required for the PhD degree.
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
- BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
- CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
- CSCI 5106 - Programming Languages (3.0 cr)
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
- CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
- CSCI 8725 - Databases for Bioinformatics (3.0 cr)
- DES 5185 - Human Factors in Design (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- GCD 8103 - Human Histology (5.0 cr)
- HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
- HINF 5494 - Topics in Health Informatics (1.0 - 3.0 cr)
- HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
- HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
- HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
- HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
- HINF 5630 - Clinical Data Mining (3.0 cr)
- HINF 5640 - Advanced Translational Bioinformatics Methods (3.0 cr)
- HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
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<tr>
<th>Course Code</th>
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<tr>
<td>HINF 8220</td>
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<td>HINF 8535</td>
<td>Advanced Health Informatics Research Methods (3.0 cr)</td>
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<td>Foundations of Human Factors/Ergonomics (3.0 cr)</td>
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<td>LING 5001</td>
<td>Introduction to Linguistics (4.0 cr)</td>
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<td>LING 5205</td>
<td>Semantics (3.0 cr)</td>
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<td>MATH 5445</td>
<td>Mathematical Analysis of Biological Networks (4.0 cr)</td>
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<td>Introduction to the Mathematics of Image and Data Analysis (4.0 cr)</td>
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<td>Introduction to Stochastic Processes (4.0 cr)</td>
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<td>MEDC 5245</td>
<td>Introduction to Drug Design (3.0 cr)</td>
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<td>MILI 6992</td>
<td>Healthcare Delivery Innovations:Optimizing Cost and Quality (2.0 cr)</td>
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<td>MILI 6995</td>
<td>Medical Industry Valuation Laboratory (2.0 cr)</td>
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<td>Interprofessional Health Care Informatics (3.0 cr)</td>
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<td>NURS 7109</td>
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<td>Clinical Decision Support: Theory (2.0 cr)</td>
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<td>NURS 7114</td>
<td>Clinical Decision Support Practicum (2.0 cr)</td>
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<td>NURS 7118</td>
<td>Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)</td>
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<td>NURS 7610</td>
<td>System Leadership and Innovation (3.0 cr)</td>
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<td>PHAR 6224</td>
<td>Advanced Pharmacogenomics and Precision Medicine (2.0 cr)</td>
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<td>PUBH 6020</td>
<td>Fundamentals of Social and Behavioral Science (2.0 cr)</td>
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<td>PUBH 6102</td>
<td>Issues in Environmental Health (2.0 cr)</td>
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<td>PUBH 6131</td>
<td>Working in Global Health (2.0 cr)</td>
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<td>PUBH 6320</td>
<td>Fundamentals of Epidemiology (3.0 cr)</td>
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<td>PUBH 6325</td>
<td>Data Processing with PC-SAS (1.0 cr)</td>
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<td>PUBH 6341</td>
<td>Epidemiologic Methods I (3.0 cr)</td>
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<td>PUBH 6386</td>
<td>Cardiovascular Disease Epidemiology and Prevention (2.0 cr)</td>
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<td>PUBH 6420</td>
<td>Introduction to SAS Programming (1.0 cr)</td>
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<td>PUBH 6541</td>
<td>Statistics for Health Management Decision Making (3.0 cr)</td>
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<td>PUBH 6555</td>
<td>Health Economics (2.0 cr)</td>
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<td>PUBH 6556</td>
<td>Health and Health Systems (3.0 cr)</td>
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<td>PUBH 6557</td>
<td>Health Finance I (3.0 cr)</td>
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<td>PUBH 6558</td>
<td>Health Finance II (3.0 cr)</td>
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<td>PUBH 6560</td>
<td>Operations Research and Quality in Health Care (3.0 cr)</td>
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<td>PUBH 6562</td>
<td>Information Technology in Health Care (2.0 cr)</td>
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<td>PUBH 6564</td>
<td>Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)</td>
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<td>PUBH 6565</td>
<td>Innovation of Healthcare Services (2.0 cr)</td>
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<td>PUBH 6717</td>
<td>Decision Analysis for Health Care (2.0 cr)</td>
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<td>PUBH 6724</td>
<td>The Health Care System and Public Health (3.0 cr)</td>
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<td>PUBH 6742</td>
<td>Ethics in Public Health: Research and Policy (1.0 cr)</td>
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<td>PUBH 6751</td>
<td>Principles of Management in Health Services Organizations (2.0 cr)</td>
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<td>PUBH 6765</td>
<td>Continuous Quality Improvement: Methods and Techniques (3.0 cr)</td>
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<td>PUBH 6780</td>
<td>Topics in Public Health Administration and Policy (1.0 - 3.0 cr)</td>
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<td>PUBH 6800</td>
<td>Topics: Health Services Research and Policy (0.5 - 4.0 cr)</td>
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<td>PUBH 6803</td>
<td>Conducting a Systematic Literature Review (3.0 cr)</td>
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<td>PUBH 6806</td>
<td>Advanced Methods in Health Decision Science (3.0 cr)</td>
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<td>PUBH 6832</td>
<td>Economics of the Health Care System (3.0 cr)</td>
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<tr>
<td>PUBH 6862</td>
<td>Cost-Effectiveness Analysis in Health Care (3.0 cr)</td>
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<td>PUBH 6863</td>
<td>Understanding Health Care Quality (2.0 cr)</td>
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<td>PUBH 7400</td>
<td>Topics: Biostatistics (0.5 - 4.0 cr)</td>
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<td>PUBH 7401</td>
<td>Fundamentals of Biostatistical Inference (4.0 cr)</td>
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<td>PUBH 7402</td>
<td>Biostatistics Modeling and Methods (4.0 cr)</td>
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<td>PUBH 7405</td>
<td>Biostatistical Inference I (4.0 cr)</td>
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<td>PUBH 7407</td>
<td>Analysis of Categorical Data (3.0 cr)</td>
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<tr>
<td>PUBH 7415</td>
<td>Introduction to Clinical Trials (3.0 cr)</td>
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Data Science and Informatics for Learning Health Systems

The data science and informatics for learning health systems track builds on the highly regarded data science program offered jointly by the School of Engineering, School of Public Health, and School of Statistics. It also takes advantage of the School of Nursing's breadth of nursing and health informatics courses.

Students who pursue the data science and informatics for learning health systems track are expected to earn the University's data science MS degree en route to completing the PhD.

Students must consult with the APC to coordinate completion of coursework and other requirements for the data science MS, the health informatics PhD, and the data science and informatics for learning health systems track. Credits earned in the University's data science MS program may be used to fulfill required courses or elective credits in the data science and informatics for learning health systems track, subject to APC approval. Students who have an MS in data science from a comparable program may be exempt from this requirement in whole or in part, subject to APC review and approval.

Data Science and Informatics Coursework (32 credits)

Core Coursework (18 credits)
Take the following courses, in consultation with the APC, after completion of the data science MS degree. Take HINF 5496 and HINF 8492 for at least 3 credits each.

- HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
- HINF 5630 - Clinical Data Mining (3.0 cr)
- HINF 8220 - Computational Causal Analytics (3.0 cr)
- HINF 8492 - Advanced Readings or Research in Health Informatics (1.0 - 6.0 cr)

Elective Coursework (14 credits)
Select at least 14 elective credits from the following list, in consultation with the APC, to complete the 46 course credits required for the PhD degree. Credits earned in pursuit of the data science MS may be used to fulfill elective course requirements for this track, subject to APC approval.

Take 14 or more course(s) from the following:

Informatics
- Take 0 or more course(s) from the following:
  - HINF 5431 - Foundations of Health Informatics II (3.0 cr)
  - HINF 8431 - Foundations of Health Informatics II Lab (2.0 cr)
  - HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
  - HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
  - HINF 5647 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)

Applications
- Take 0 or more course(s) from the following:
  - NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
  - PUBH 6102 - Issues in Environmental Health (2.0 cr)
  - PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
• PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
• PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
• PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)

• Advanced Methodology
Take 0 or more course(s) from the following:
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
• PUBH 8462 - Advanced Survival Analysis (3.0 cr)
• PUBH 8472 - Spatial Biostatistics (3.0 cr)

• Data Science
Take 0 or more course(s) from the following:
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5511 - Time Series Analysis (3.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
• CSCI 5523 - Introduction to Data Mining (3.0 cr)
• CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
• PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)

Translational Bioinformatics
The translational bioinformatics track bridges genomics and bioinformatics to precision medicine through its methods and techniques development and innovation that directly relate to the study of basic biological science and diseases. The computational methods related to genomics, epigenomics, transcriptomics, proteomics, metabolomics, and pharmacogenomics are included, which build the connection of molecular findings and phenotypes to characterize disease susceptibility or determine disease markers, and predict response to treatment and prognosis. The program offers three specialized areas: structural and functional genomics, microbiomics and metagenomics, and cancer genomics.

Students must consult with the APC to coordinate completion of coursework and other requirements.

Translational Bioinformatics Coursework (32 credits)

Phase I (22 credits)
Take the following courses for a total of 22 credits:
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
HINF 8220 - Computational Causal Analytics (3.0 cr)
HINF 5650 - Integrative Genomics and Computational Methods (3.0 cr)
STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)

Phase II (6 credits)
Take the following courses after completing Phase I, and with the approval of the APC:
HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
HINF 8492 - Advanced Readings or Research in Health Informatics (1.0 - 6.0 cr)

Elective Coursework (4 credits)
Select at least 4 elective credits from the following list, in consultation with the APC, to complete the 46 course credits required for the PhD degree.
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 8431 - Foundations of Health Informatics II Lab (2.0 cr)
HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
MEDC 5245 - Introduction to Drug Design (3.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
Precision and Personalized Medicine Informatics

The precision and personalized medicine informatics track provides a didactic program for students training in informatics who will develop specialized knowledge in precision informatics methods applied to personal and population health-focused problems. The scope of this track includes social determinants of health and inter-professional research and expertise. Students will develop skills in quantitative methods and biomedical sciences for their application to precision medicine. In addition, students will gain an understanding of medical and biological science to provide needed context on which to apply informatics methods.

Students must consult with the APC to coordinate completion of coursework and other requirements.

Precision and Personalized Medicine Informatics Coursework (32 credits)

Phase I (19 credits)
Take the following courses:
- HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
  or HINF 5630 - Clinical Data Mining (3.0 cr)

Phase II (8 credits)
Take the following courses after completing Phase I, and with the approval of the APC. Take HINF 5496 and HINF 8492 for at least 3 credits each.
- HINF 5496 - Internship in Health Informatics (1.0 - 6.0 cr)
- HINF 8492 - Advanced Readings or Research in Health Informatics (1.0 - 6.0 cr)
- PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)

Elective Coursework (5 credits)
Select at least 5 elective credits, in consultation with the APC, to complete the 46 course credits required for the PhD degree.
- HINF 5431 - Foundations of Health Informatics II (3.0 cr)
- MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
- MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
- STAT 5511 - Time Series Analysis (3.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
Twin Cities Campus

History of Science, Technology, and Medicine M.A.
History of Science & Technology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 585 Shepherd Labs, 100 Union Street S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-301-1442)
Email: hstm@umn.edu
Website: http://cse.umn.edu/hstm

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must have a bachelor's degree with a preferred grade average of B or better and must be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

Although it is not strictly required for admission, it's strongly recommended that applicants submit a GRE score.

Special Application Requirements:
All application materials are submitted online to the University. Applications are accepted for fall admission only. The application deadline is December 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in one foreign language.

A minimum GPA of 3.30 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B earned for each course.

Students select one of two tracks: the history of science and technology or the history of medicine.

Coursework is subject to distribution requirements in terms of area and period. To meet the period distribution requirement, all students must take at least one course covering material in the pre-1800 period and one course covering material in the post-1800 period.

Students in the History of Science and Technology (HSCI) track are required to meet the area distribution requirement by completing a minimum of two courses in each of two fields. There are four fields in the HSCI track from which to choose: 1. History of the Physical Sciences 2. History of the Biological Sciences 3. History of Technology 4. History of Science and Technology in American Culture

Additional information is stipulated in the Graduate Handbook. The period and area distribution requirements are completed in consultation with the advisor and director of graduate studies. HSCI/HMED 8112 and 8113 cannot fulfill period or area distribution requirements.

Core Coursework (6 credits)
Select one of the following sequences in consultation with the advisor:

- HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
- HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)
- or HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
- HSCI 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

Period Distribution Requirement
At least 1 course meeting MA degree requirements must also cover material in the pre-1800 period and at least 1 course must also cover material in the post-1800 period. Select coursework from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.

Pre-1800 Course (1 course)
- EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
- HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
- HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
- HSCI 8124 - Foundations for Research in Ancient Science (3.0 cr)
- HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
- HSCI 8900 - Seminar: History of Early Physical Science (3.0 cr)

Post-1800 Course (1 course)
- HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
- HIST 8960 - Topics in History (1.0 - 4.0 cr)
- HIST 8993 - Directed Study (1.0 - 16.0 cr)
- HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
- HMED 5940 - Topics in the History of Medicine (3.0 cr)
- HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
- HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
- HMED 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)
- HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [DIV] (3.0 cr)
- HSCI 5242 - Navigating a Darwinian World (3.0 cr)
- HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
- HSCI 5246 - History of (Un)Natural Disasters (3.0 cr)
- HSCI 5331 - Technology and American Culture (3.0 cr)
- HSCI 5332 - Science in the Shaping of America (3.0 cr)
- HSCI 5401 - Ethics in Science and Technology (3.0 cr)
- HSCI 5421 - Engineering Ethics (3.0 cr)
- HSCI 8131 - Industrial Revolutions (3.0 cr)
- HSCI 8421 - Social and Cultural Studies of Science (3.0 cr)
HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
HSCI 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)
HSCI 8910 - Seminar: History of Modern Physical Sciences (3.0 cr)
HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

History of Medicine

**History of Medicine Coursework (9 to 15 credits)**
Plan A students select 9 credits, and Plan B students select 15 credits from the following in consultation with the advisor:
HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
HMED 5940 - Topics in the History of Medicine (3.0 cr)
HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
HMED 8135 - Disease and Debility in History (3.0 cr)
HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
HMED 8631 - Directed Study (1.0 - 6.0 cr)
HMED 8632 - Directed Study (1.0 - 6.0 cr)
HMED 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)

Outside Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval,
EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)
EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8940 - Topics in History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HSCI 5242 - Navigating a Darwinian World (3.0 cr)
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
HSCI 5246 - History of (Un)Natural Disasters (3.0 cr)
HSCI 5331 - Technology and American Culture (3.0 cr)
HSCI 5332 - Science in the Shaping of America (3.0 cr)
HSCI 5401 - Ethics in Science and Technology (3.0 cr)
HSCI 5421 - Engineering Ethics (3.0 cr)
HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
HSCI 5993 - Directed Studies (1.0 - 15.0 cr)
HSCI 8124 - Foundations for Research in Ancient Science (3.0 cr)
HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
HSCI 8131 - Industrial Revolutions (3.0 cr)
HSCI 8421 - Social and Cultural Studies of Science (3.0 cr)
HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
HSCI 8900 - Seminar: History of Early Physical Science (3.0 cr)
HSCI 8910 - Seminar: History of Modern Physical Sciences (3.0 cr)
HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
HSCI 8930 - Seminar: History of Technology (3.0 cr)
HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)
HSCI 8993 - Directed Studies (1.0 - 5.0 cr)
HSCI 8994 - Directed Research (1.0 - 5.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
MST 5012 - Museum Practices (3.0 cr)
MST 5020 - Internship (1.0 - 6.0 cr)

Plan Options

**Plan A**

**Thesis Credits**
Take 10 master's thesis credits.
HMED 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Plan B

Project Credits (3 credits)
Take 1 of the following, in consultation with the advisor, for 3 credits:
- HMED 8631 - Directed Study (1.0 - 6.0 cr)
- or HMED 8632 - Directed Study (1.0 - 6.0 cr)

History of Science and Technology

History of Science and Technology Coursework (9 to 15 credits)
Plan A students select 9 credits, and Plan B students select 15 credits from the following in consultation with the advisor:
- HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
- HSCI 5242 - Navigating a Darwinian World (3.0 cr)
- HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
- HSCI 5246 - History of (Un)Natural Disasters (3.0 cr)
- HSCI 5331 - Technology and American Culture (3.0 cr)
- HSCI 5332 - Science in the Shaping of America (3.0 cr)
- HSCI 5401 - Ethics in Science and Technology (3.0 cr)
- HSCI 5421 - Engineering Ethics (3.0 cr)
- HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
- HSCI 5993 - Directed Studies (1.0 - 15.0 cr)
- HSCI 8124 - Foundations for Research in Ancient Science (3.0 cr)
- HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
- HSCI 8131 - Industrial Revolutions (3.0 cr)
- HSCI 8421 - Social and Cultural Studies of Science (3.0 cr)
- HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
- HSCI 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)
- HSCI 8900 - Seminar: History of Early Physical Science (3.0 cr)
- HSCI 8910 - Seminar: History of Modern Physical Sciences (3.0 cr)
- HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
- HSCI 8930 - Seminar: History of Technology (3.0 cr)
- HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
- HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)
- HSCI 8993 - Directed Studies (1.0 - 5.0 cr)
- HSCI 8994 - Directed Research (1.0 - 5.0 cr)

Outside Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.
- EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)
- EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
- HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
- HIST 8960 - Topics in History (1.0 - 4.0 cr)
- HIST 8993 - Directed Study (1.0 - 16.0 cr)
- HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
- HMED 5940 - Topics in the History of Medicine (3.0 cr)
- HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
- HMED 8135 - Disease and Debility in History (3.0 cr)
- HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
- HMED 8631 - Directed Study (1.0 - 6.0 cr)
- HMED 8632 - Directed Study (1.0 - 6.0 cr)
- MST 5011 - Museum History and Philosophy (3.0 cr)
- MST 5012 - Museum Practices (3.0 cr)
- MST 5020 - Internship (1.0 - 6.0 cr)

Plan Options

Plan A

Thesis Credits
Take 10 master's thesis credits.
- HSCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Project Credits (3 credits)
Take 1 of the following, in consultation with the advisor, for 3 credits:
HSCI 8993 - Directed Studies (1.0 - 5.0 cr)

or HSCI 8994 - Directed Research (1.0 - 5.0 cr)
Twin Cities Campus
History of Science, Technology, and Medicine Minor

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 585 Shepherd Labs, 100 Union Street SE, Minneapolis, MN 55455 (612-624-7069; fax: 612-301-1442)
Email: hstm@umn.edu
Website: http://cse.umn.edu/hstm

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the History of Science, Technology, and Medicine director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B earned for each course.

The minimum required GPA for the minor is 3.00.

Students are strongly encouraged to take minor field coursework from multiple faculty members.

Minor Courses (6-12 credits)
Masters students select 6 credits, and doctoral students select 12 credits from the following in consultation with the History of Science, Technology, and Medicine director of graduate studies. Coursework should reflect both an identifiable focus and breadth. HSCI or HMED 8112 is strongly recommended.

HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
HMED 5940 - Topics in the History of Medicine (3.0 cr)
HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)
HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>Engineering Ethics</td>
<td>3.0 cr</td>
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</tr>
<tr>
<td>HSCI 8950</td>
<td>Seminar: Science and Technology in Cultural Settings</td>
<td>3.0 cr</td>
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</tbody>
</table>

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral**
Twin Cities Campus

History of Science, Technology, and Medicine Ph.D.

History of Science & Technology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 585 Shepherd Labs, 100 Union Street S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-301-1442)
Email: hstm@umn.edu
Website: https://cse.umn.edu/hstm

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisities for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must have a bachelor's degree with a preferred grade average of B or better and must be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

Although it is not strictly required for admission, it's strongly recommended that applicants submit a GRE score.

Special Application Requirements:
All application materials are submitted online to the University. Applications are accepted for fall semester only. The application deadline is December 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of November 07, 2022
24 credits are required in the major.
6 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in two foreign languages.

A minimum GPA of 3.30 is required for students to remain in good standing.

Courses must be taken on the A-F grade basis, unless only offered S/N, with a minimum grade of B earned for each course.

Students select one of two tracks: the history of science and technology or the history of medicine.

Coursework is subject to distribution requirements in terms of area and period. To meet the period distribution requirement, all students must take at least one course covering material in the pre-1800 period and one course covering material in the post-1800 period.

Students in the History of Science and Technology (HSCI) track are required to meet the area distribution requirement by completing a minimum of two courses in each of two fields. There are four fields in the HSCI track from which to choose: 1. History of the Physical Sciences 2. History of the Biological Sciences 3. History of Technology 4. History of Science and Technology in American Culture

Additional information is stipulated in the Graduate Handbook. The period and area distribution requirements are completed in consultation with the advisor and director of graduate studies. HSCI/HMED 8112 and 8113 cannot fulfill period or area distribution requirements.

Core Coursework (6 credits)
Select one of the following sequences in consultation with the advisor:

HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)
or
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HSCI 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

Period Distribution Requirement
At least 1 course meeting PhD degree requirements must also cover material in the pre-1800 period and at least 1 course must also cover material in the post-1800 period. Select coursework from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.

Pre-1800 Course (1 course)
EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
HSCI 8124 - Foundations for Research in Ancient Science (3.0 cr)
HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
HSCI 8900 - Seminar: History of Early Physical Science (3.0 cr)

Post-1800 Course (1 course)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
HMED 5940 - Topics in the History of Medicine (3.0 cr)
HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
HMED 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)
HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
HSCI 5242 - Navigating a Darwinian World (3.0 cr)
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
HSCI 5246 - History of (Un)Natural Disasters (3.0 cr)
HSCI 5331 - Technology and American Culture (3.0 cr)
HSCI 5332 - Science in the Shaping of America (3.0 cr)
HSCI 5401 - Ethics in Science and Technology (3.0 cr)
HSCI 5421 - Engineering Ethics (3.0 cr)
HSCI 8131 - Industrial Revolutions (3.0 cr)
HSCI 8421 - Social and Cultural Studies of Science (3.0 cr)
HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
HSCI 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)
HSCI 8910 - Seminar: History of Modern Physical Sciences (3.0 cr)
HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)

**Thesis Credits**
Take 24 doctoral thesis credits after passing the preliminary oral exam.
HMED 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
or HSCI 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**History of Medicine**

**History of Medicine Coursework (18 credits)**
Select 15 credits from the following in consultation with the advisor:

- HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
- HMED 5940 - Topics in the History of Medicine (3.0 cr)
- HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
- HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
- HMED 8135 - Disease and Debility in History (3.0 cr)
- HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
- HMED 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)

Take 1 of the following, in consultation with the advisor, for 3 credits:

- HMED 8631 - Directed Study (1.0 - 6.0 cr)
-or HMED 8632 - Directed Study (1.0 - 6.0 cr)

**Outside Coursework (6 credits)**
Select 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.

- EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)
- EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
- HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
- HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
- HIST 8960 - Topics in History (1.0 - 4.0 cr)
- HIST 8993 - Directed Study (1.0 - 16.0 cr)
- HSCI 5242 - Navigating a Darwinian World (3.0 cr)
- HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
- HSCI 5246 - History of (Un)Natural Disasters (3.0 cr)
- HSCI 5331 - Technology and American Culture (3.0 cr)
- HSCI 5332 - Science in the Shaping of America (3.0 cr)
- HSCI 5401 - Ethics in Science and Technology (3.0 cr)
- HSCI 5421 - Engineering Ethics (3.0 cr)
- HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
- HSCI 5993 - Directed Studies (1.0 - 15.0 cr)
- HSCI 8124 - Foundations for Research in Ancient Science (3.0 cr)
- HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
- HSCI 8131 - Industrial Revolutions (3.0 cr)
- HSCI 8421 - Social and Cultural Studies of Science (3.0 cr)
- HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
- HSCI 8900 - Seminar: History of Early Physical Science (3.0 cr)
- HSCI 8910 - Seminar: History of Modern Physical Sciences (3.0 cr)
- HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
- HSCI 8930 - Seminar: History of Technology (3.0 cr)
- HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
- HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)
- HSCI 8993 - Directed Studies (1.0 - 5.0 cr)
- HSCI 8994 - Directed Research (1.0 - 5.0 cr)
- MST 5011 - Museum History and Philosophy (3.0 cr)
- MST 5012 - Museum Practices (3.0 cr)
- MST 5020 - Internship (1.0 - 6.0 cr)

**History of Science and Technology**
History of Science and Technology Coursework (18 credits)
Select 15 credits from the following in consultation with the advisor:

HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
HSCI 5242 - Navigating a Darwinian World (3.0 cr)
HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
HSCI 5246 - History of (Un)Natural Disasters (3.0 cr)
HSCI 5331 - Technology and American Culture (3.0 cr)
HSCI 5332 - Science in the Shaping of America (3.0 cr)
HSCI 5401 - Ethics in Science and Technology (3.0 cr)
HSCI 5421 - Engineering Ethics (3.0 cr)
HSCI 5611 - Enlightenment, Revolution, and the Rise of Modern Science (3.0 cr)
HSCI 5993 - Directed Studies (1.0 - 15.0 cr)
HSCI 8124 - Foundations for Research in Ancient Science (3.0 cr)
HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
HSCI 8131 - Industrial Revolutions (3.0 cr)
HSCI 8421 - Social and Cultural Studies of Science (3.0 cr)
HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
HSCI 8830 - Topics in the History of Science, Technology, and Medicine (3.0 cr)
HSCI 8900 - Seminar: History of Early Physical Science (3.0 cr)
HSCI 8910 - Seminar: History of Modern Physical Sciences (3.0 cr)
HSCI 8920 - Seminar: History of Biological Sciences (3.0 cr)
HSCI 8930 - Seminar: History of Technology (3.0 cr)
HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)

Take 1 of the following for 3 credits, in consultation with the advisor:

HSCI 8993 - Directed Studies (1.0 - 5.0 cr)
or HSCI 8994 - Directed Research (1.0 - 5.0 cr)

Outside Coursework (6 credits)
Select 6 credits from the following in consultation with the advisor. Other courses may be chosen with advisor and director of graduate studies approval.

EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)
EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
HIST 5910 - Topics in U.S. History (1.0 - 4.0 cr)
HIST 8840 - Topics in Asian History (1.0 - 4.0 cr)
HIST 8960 - Topics in History (1.0 - 4.0 cr)
HIST 8993 - Directed Study (1.0 - 16.0 cr)
HMED 5075 - Technology and Medicine in Modern America (3.0 cr)
HMED 5940 - Topics in the History of Medicine (3.0 cr)
HMED 8002 - Foundations in the History of Modern Medicine, 1800-present (3.0 cr)
HMED 8135 - Disease and Deblility in History (3.0 cr)
HMED 8220 - Seminar: Current Topics in the History of Medicine (3.0 cr)
HMED 8631 - Directed Study (1.0 - 6.0 cr)
HMED 8632 - Directed Study (1.0 - 6.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
MST 5012 - Museum Practices (3.0 cr)
MST 5020 - Internship (1.0 - 6.0 cr)
Program Requirements

**Plan C**: Plan C requires 45 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project**: Students will participate in a three-credit capstone seminar rather than a thesis. The capstone seminar is one of the required core courses.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A 200-hour, non-credit professional internship, supervised by the Human Rights program, is required. Completion of the internship during the summer after the first year is expected.

4xxx-level coursework is limited to language courses unless approved by the director of graduate studies.

Excluding electives, all courses offered on both the A-F and S/N grading basis must be taken A-F.

**Human Rights Core (11 credits)**

If HIST 8910 is taken, topic must be Human Rights and Race.

- **PA 5886** - Master of Human Rights Cohort Seminar I (1.0 cr)
- **PA 5887** - Master of Human Rights Cohort Seminar II (1.0 cr)

Take 3 or more course(s) totaling 9 or more credit(s) from the following:
- **GLOS 5403** - Human Rights Advocacy (3.0 cr)
- **HIST 8245** - Human Rights: A Global History (3.0 cr)
- **HIST 8910** - Topics in U.S. History (1.0 - 4.0 cr)
- **LAW 6886** - International Human Rights Law (3.0 cr)
- **PA 5885** - Human Rights Policy: Issues and Actors (3.0 cr)
- **SOC 8171** - Cross-Disciplinary Perspectives in Human Rights (3.0 cr)

**Professional Core (12 credits)**

Select credits from each of the following 4 professional core areas, in consultation with the advisor, to satisfy the 12-credit professional core minimum:

**Quantitative**
- Higher-level options available for students with strong statistical background, with director of graduate studies approval.
  - **PA 5031** - Statistics for Public Affairs (4.0 cr)
  - **PA 5032** - Applied Regression (2.0 cr)
  - **PA 5033** - Multivariate Techniques (2.0 cr)
  - **PA 5044** - Applied Regression, Accelerated (2.0 cr)
  - **PA 5045** - Statistics for Public Affairs, Accelerated (4.0 cr)
  - **SOC 5811** - Social Statistics for Graduate Students (3.0 cr)
  - **STAT 5021** - Statistical Analysis (4.0 cr)
  - **STAT 5401** - Applied Multivariate Methods (3.0 cr)

**Qualitative**
- **OLPD 5061** - Ethnographic Research Methods (3.0 cr)
- **PA 5041** - Qualitative Methods for Policy Analysts (4.0 cr)
- **SOC 8852** - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)

**Management**
- **PA 5011** - Management of Organizations (3.0 cr)
- **PA 5101** - Management and Governance of Nonprofit Organizations (3.0 cr)
- **PA 5151** - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)

**Policy and Economic Analysis**
- **PA 5002** - Introduction to Policy Analysis (1.5 cr)
- **PA 5012** - The Politics of Public Affairs (3.0 cr)
- **PA 5021** - Microeconomics for Policy Analysis (3.0 cr)
- **PA 5022** - Applications of Economics for Policy Analysis (1.5 - 3.0 cr)
- **PA 5431** - Public Policies on Work and Pay (3.0 cr)
- **PA 5503** - Economics of Development (3.0 cr)
- **PA 5521** - Development Planning and Policy Analysis (4.0 cr)
- **PA 5722** - Economics of Environmental Policy (3.0 cr)
- **PA 5801** - Global Public Policy (3.0 cr)
- **PA 5805** - Global Economics (3.0 cr)

**Capstone or Professional Paper**

Take 1 or more course(s) from the following:
- **PA 8081** - Capstone Workshop (3.0 cr)
- **PA 8082** - Professional Paper-Writing Seminar (3.0 cr)
Electives
Select elective credits as needed, in consultation with the advisor, to meet the 45-credit minimum.

Concentrations: Pre-Designed
Students complete 12 credits in a pre-designed or self-designed concentration. Pre-designed concentrations are listed below. Consult the program or adviser for courses which do not appear but which may be eligible with consent of adviser.

Arts and Humanities
This concentration is meant to prepare students in the understanding of the role of artistic, literary and cultural practices in the promotion of cultures that support and respect human rights. Students will work with their faculty advisor to choose 12 credits from the following or other courses appropriate to their particular arts and humanities focus. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."

- ARTS 5710 - Advanced Photography and Moving Image Projects (4.0 cr)
- ARTS 5760 - Experimental Film and Video (4.0 cr)
- ENGW 5102 - Graduate Fiction Writing (4.0 cr)
- ENGW 5106 - Graduate Literary Nonfiction Writing (4.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)

-OR-

Conflict, Security, and Diplomacy
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."

- GLOS 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
- LAW 6027 - Law of the Sea (2.0 cr)
- LAW 6071 - International Law (3.0 cr)
- LAW 6648 - International Criminal Law (3.0 cr)
- LAW 6708 - Terrorism, Counter-Terrorism, and International Law (2.0 cr)
- LAW 6887 - Law of International Organizations (2.0 cr)
- LAW 6889 - Laws of War (3.0 cr)
- LAW 6918 - Rule of Law (2.0 cr)
- PA 5801 - Global Public Policy (3.0 cr)
- PA 5813 - US Foreign Policy: Issues and Institutions (3.0 cr)
- PA 5814 - Global Diplomacy in a Time of Change (3.0 cr)
- PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
- PA 5825 - Crisis Management in Foreign Affairs (1.5 cr)
- PA 5826 - National Security Policy (3.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
- POL 8401 - International Relations (3.0 cr)
- POL 8402 - International Security (3.0 cr)
- POL 8403 - International Norms and Institutions (3.0 cr)
- SOC 5171 - Sociology of International Law: Human Rights & Trafficking [GP] (3.0 cr)
- SOC 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)

-OR-

Crime, Law, and Justice
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."

- GLOS 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
- LAW 6621 - Rights in Conflict: Citizenship and Human Rights (2.0 cr)
- LAW 6648 - International Criminal Law (3.0 cr)
- LAW 6718 - Immigration and Criminal Law: Immigration Consequences of Crimes and Criminalizing Migration (2.0 cr)
- LAW 6893 *(Inactive)* (2.0 cr)
- LAW 6918 - Rule of Law (2.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
- PHIL 5321 - Theories of Justice (3.0 cr)
- POL 5492 - Law and (In)Justice in Latin America (3.0 cr)
- SOC 5101 - Sociology of Law (3.0 cr)
- SOC 5104 - Crime and Human Rights (3.0 cr)
- SOC 5171 - Sociology of International Law: Human Rights & Trafficking [GP] (3.0 cr)
- SOC 5315 - Never Again! Memory & Politics after Genocide [GP] (3.0 cr)
- SOC 8111 - Criminology (3.0 cr)
- SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)

*PA 8921* - Master's: Professional Paper (Individual Option) (1.0 - 3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)

-OR-

Development
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."

DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
GCC 5003 - Seeking Solutions to Global Health Issues [GP] (3.0 cr)
GCC 5005 - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
GCC 5041 - Transition to a Sustainable World: Can Psychology Help Facilitate Global Sustainability? [ENV] (3.0 cr)
LAW 6879 - Poverty and Human Rights (2.0 cr)
LAW 6887 - Law of International Organizations (2.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 5405 - Public Policy Implementation (3.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5503 - Economics of Development (3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)
PA 5561 - Gender and International Development (3.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)

-OR-

Environment
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."

ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
GCC 5011 - Pathways to Renewable Energy [TS] (3.0 cr)
GCC 5013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)
GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
GCC 5027 - Power Systems Journey: Making the Invisible Visible and Actionable [TS] (3.0 cr)
GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
GCC 5032 - Ecosystems Health: Leadership at the intersection of humans, animals and the environment [ENV] (3.0 cr)
LAW 6062 - Energy Law (3.0 cr)
LAW 6215 - Environmental Law (3.0 cr)
LAW 6234 - Public Lands and Natural Resources (3.0 cr)
LAW 6400 - International Environmental Law (2.0 cr)
PA 5013 - Law and Urban Land Use (1.5 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5243 - Environmental Justice in Urban Planning & Public Policy (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PA 5723 - Water Policy (3.0 cr)
PA 5724 - Climate Change Policy (3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6154 - Climate Change and Global Health (3.0 cr)

-OR-

Gender and Sexuality
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5690 and select "Gender and Electoral Politics in Global Perspective." Students may take PA 5890 and select either "Women's Human Rights in Practice" or "Fact-finding Investigations on Human Rights."

AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
AMST 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)

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Information current as of November 07, 2022
BTHX 5510 - Gender and the Politics of Health (3.0 cr)
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 5503 - Queering Theory (3.0 cr)
GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
LAW 6036 - Reproductive Rights (3.0 cr)
LAW 6827 - Women's International Human Rights (2.0 cr)
LAW 6862 - Sexual Orientation, Gender Identity, and Human Rights (2.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
PA 5426 - Community-Engaged Research and Policy with Marginalized Groups (3.0 cr)
PA 5561 - Gender and International Development (3.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
PA 5631 - LGBTQ Politics & Policy (1.5 cr)
PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PHIL 5622 - Philosophy and Feminist Theory (3.0 cr)
PUBH 6081 - Sex, Sexuality, and Sexual Health (2.0 cr)
PUBH 6675 - Women's Health (2.0 cr)
SOC 5171 - Sociology of International Law: Human Rights & Trafficking [GP] (3.0 cr)
SOC 5221 - Sociology of Gender (3.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)

-OR-

Migration
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."
AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
CHIC 5374 - Migrant Farmworkers in the United States: Families, Work, and Advocacy [CIV] (4.0 cr)
LAW 6027 - Law of the Sea (2.0 cr)
LAW 6621 - Rights in Conflict: Citizenship and Human Rights (2.0 cr)
LAW 6718 - Immigration and Criminal Law: Immigration Consequences of Crimes and Criminalizing Migration (2.0 cr)
LAW 6719 - Immigration Reforms through History: An Ongoing Racial Narrative (2.0 cr)
LAW 6872 - Immigration Law (3.0 cr)
LAW 6918 - Rule of Law (2.0 cr)
PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
SOC 5171 - Sociology of International Law: Human Rights & Trafficking [GP] (3.0 cr)
SOC 8607 - Migration & Migrants in Demographic Perspective (3.0 cr)

-OR-

NGO Leadership and Management
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."
LAW 6637 - Business and Human Rights (2.0 cr)
LAW 6887 - Law of International Organizations (2.0 cr)
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
PA 5051 - Leadership Foundations (2.0 cr)
PA 5052 - Public Affairs Leadership (2.0 cr)
PA 5081 - Understanding Power and Teamwork in Public Affairs Education (0.5 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5103 - Leadership and Change (1.5 - 3.0 cr)
PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
PA 5108 - Board leadership development (1.0 cr)
PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
PA 5116 - Financing Public and Nonprofit Organizations (1.5 cr)
PA 5125 - Philanthropy in America: History, Practice, and Trends (1.5 - 3.0 cr)
PA 5135 - Managing Conflict: Negotiation (3.0 cr)
PA 5137 - Project Management in the Public Arena (1.5 cr)
PA 5145 - Civic Participation in Public Affairs (3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PA 5251</td>
<td>Strategic Planning and Management</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5311</td>
<td>Program Evaluation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5405</td>
<td>Public Policy Implementation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5501</td>
<td>Theories and Policies of Development</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5801</td>
<td>Global Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5890</td>
<td>Topics in Foreign Policy and International Affairs</td>
<td>(0.5 - 5.0 cr)</td>
</tr>
<tr>
<td>PA 5927</td>
<td>Effective Grantwriting for Nonprofit Organizations</td>
<td>1.5 cr</td>
</tr>
</tbody>
</table>

**Project and Policy Evaluation**

Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select the topic, "Fact-finding Investigations on Human Rights."

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OLPD 5501</td>
<td>Principles and Methods of Evaluation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>OLPD 5502</td>
<td>Comparative evaluation theory for practice</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>OLPD 8502</td>
<td>Advanced Evaluation Theory and Theory crafting</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5103</td>
<td>Leadership and Change</td>
<td>1.5 - 3.0 cr</td>
</tr>
<tr>
<td>PA 5105</td>
<td>Integrative Leadership: Leading Across Sectors to Address Grand Challenges</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5145</td>
<td>Civic Participation in Public Affairs</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5251</td>
<td>Strategic Planning and Management</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5311</td>
<td>Program Evaluation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5405</td>
<td>Public Policy Implementation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5890</td>
<td>Topics in Foreign Policy and International Affairs</td>
<td>(0.5 - 5.0 cr)</td>
</tr>
<tr>
<td>PUBH 6034</td>
<td>Evaluation I: Concepts</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6852</td>
<td>Program Evaluation in Health and Mental Health Settings</td>
<td>2.0 cr</td>
</tr>
</tbody>
</table>

**Public Health**

Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select, Fact-finding Investigations on Human Rights must be chosen. Students may take SOC 8090 and select, Global Health Data Analysis.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTHX 5325</td>
<td>Biomedical Ethics</td>
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</tr>
<tr>
<td>BTHX 5510</td>
<td>Gender and the Politics of Health</td>
<td>3.0 cr</td>
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<tr>
<td>BTHX 5520</td>
<td>Social Justice and Bioethics</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>CSPH 5111</td>
<td>Ways of Thinking about Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>GCC 5003</td>
<td>Seeking Solutions to Global Health Issues [GP]</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>GCC 5016</td>
<td>Science and Society: Working Together to Avoid the Antibiotic Resistance Apocalypse [TS]</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>GCC 5022</td>
<td>The Human Experience of Sensory Loss: Seeking Equitable and Effective Solutions [TS]</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>LAW 6879</td>
<td>Poverty and Human Rights</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PA 5890</td>
<td>Topics in Foreign Policy and International Affairs</td>
<td>(0.5 - 5.0 cr)</td>
</tr>
<tr>
<td>PA 8461</td>
<td>Global and U.S. Perspectives on Health and Mortality</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6011</td>
<td>Public Health Approaches to HIV/AIDS</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6055</td>
<td>Social Inequalities in Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6066</td>
<td>Building Communities, Increasing Health: Preparing for Community Health Work</td>
<td>2.0 cr</td>
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<td>PUBH 6081</td>
<td>Sex, Sexuality, and Sexual Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6108</td>
<td>Foundations of Global Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6131</td>
<td>Working in Global Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6132</td>
<td>Air, Water, and Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6134</td>
<td>Sustainable Development and Global Public Health</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6154</td>
<td>Climate Change and Global Health</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6182</td>
<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6241</td>
<td>American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6242</td>
<td>Cultural Humility with American Indian Populations</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6243</td>
<td>American Indian Research, Evaluation and Collaborations</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PUBH 6320</td>
<td>Fundamentals of Epidemiology</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6370</td>
<td>Social Epidemiology</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6390</td>
<td>Topics: Epidemiology</td>
<td>(0.5 - 4.0 cr)</td>
</tr>
<tr>
<td>PUBH 6613</td>
<td>Children and Youth With Special Health Care Needs</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6675</td>
<td>Women's Health</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6735</td>
<td>Principles of Health Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>SOC 8090</td>
<td>Topics in Sociology</td>
<td>(1.5 - 3.0 cr)</td>
</tr>
</tbody>
</table>

**Race and Ethnicity**

Select 12 credits from the following in consultation with the advisor. Students may take AMIN 5890 and select topic "Problems in American Indian History." Students may take PA 5480 or PA 5490 and select topic, Reparations: Policy, History & Theory. Students may take PA 5490 and select topic "Civil Rights and Black Power Movement 1954-1984. Students may take PA 5890 and select topic,
Fact-finding Investigations on Human Rights.
AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HiS, DSJ] (3.0 cr)
AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
AMIN 8301 - Critical Indigenous Theory (3.0 cr)
AMST 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
GCC 5036 - Seeking Connection through Decolonization: The Power of Indigenous Lands and Languages [DSJ] (3.0 cr)
GCC 5042 - Just Education: The Role of Higher Education in Disrupting Mass Incarceration [DSJ] (3.0 cr)
LAW 6084 - Equal Protection: Race and the Civil Rights Acts (3.0 cr)
LAW 6236 (Inactive) (3.0 cr)
PA 5002 - Introduction to Policy Analysis (1.5 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5421 - Racial Inequality and Public Policy (3.0 cr)
PA 5422 - Diversity and Public Policy (3.0 cr)
PA 5426 - Community-Engaged Research and Policy with Marginalized Groups (3.0 cr)
PA 5480 - Topics in Race, Ethnicity, and Public Policy (1.0 - 3.0 cr)
PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PA 8312 - Analysis of Discrimination (4.0 cr)
PSY 8210 - Law, Race, and Social Psychology (3.0 cr)
PUBH 6241 - American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration (2.0 cr)
PUBH 6242 - Cultural Humility with American Indian Populations (2.0 cr)
PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)
SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)

-OR-

Research Methods
Select 12 credits from the following, in consultation with the advisor. Students may take PA 5890 and select topic, "Fact-finding Investigations on Human Rights" must be chosen.
ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
LAW 6867 - Practice-Ready International Legal Research (2.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
PA 5031 - Statistics for Public Affairs (4.0 cr)
PA 5032 - Applied Regression (2.0 cr)
PA 5033 - Multivariate Techniques (2.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5044 - Applied Regression, Accelerated (2.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5426 - Community-Engaged Research and Policy with Marginalized Groups (3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
PA 5932 - Working with Data: Finding, Managing, and Using Data (1.5 cr)
PA 5933 - Survey Methods: Designing Effective Questionnaires (2.0 cr)
PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
SOC 5811 - Social Statistics for Graduate Students (3.0 cr)
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
SOC 8852 - Advanced Qualitative Research Methods: Ethnographic Practicum (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)

-OR-

Concentration: Self-Designed
Select 12 credits, in consultation with the advisor, to meet academic and professional goals. Other courses can be chosen in consultation with advisor and director of graduate studies approval.
Joint- or Dual-degree Coursework: MHR/MPH-Public Health Practice
Student may take a total of 14 credits in common among the
academic programs.
Twin Cities Campus
Integrated Biosciences M.S.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the master of science (M.S.) degree under Plan A (coursework and original thesis). The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology; and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college/university in the biological or physical sciences or a related field. Background in a variety of subdisciplines is appropriate preparation.

Other requirements to be completed before admission:
Recommended undergraduate courses for applicants pursuing the M.S. degree include one year each of chemistry, biology, and physics. One semester of calculus is also recommended. Applicants are strongly encouraged to have taken other advanced courses in chemistry, biology, additional calculus, and introductory statistics.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Coursework
**Twin Cities Campus**

**Integrated Biosciences Ph.D.**

*Medical School - Adm*

**Graduate School**

Link to a list of faculty for this program.

**Contact Information:**
Integrated Biosciences Graduate Program, University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-6898; fax: 218-726-8152)  
Email: ibs@d.umn.edu  
Website: [http://www.d.umn.edu/ibs](http://www.d.umn.edu/ibs)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 56
- This program does not require summer semesters for timely completion.
- The Integrated Biosciences Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Integrated Biosciences Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the doctor of philosophy (Ph.D.) degree. The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology; and ecology, organismal, and population (EOP) biology.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college or university in the biological or physical sciences or a related field.

Other requirements to be completed before admission:
Recommended undergraduate courses for applicants pursuing the Ph.D. degree include one year each of chemistry, biology, physics, calculus, and advanced chemistry. One semester (minimum) of statistics is also recommended.

Additional recommended courses for students in the ecology, organismal, and population (EOP) emphasis include one year of calculus, one semester each of ecology and evolutionary biology along with one course in two of the following subjects: genetics, cell biology, biochemistry.

Additional recommended courses for students in the cell, molecular, and physiological (CMP) emphasis include one year of organic chemistry plus one course in each of the following: genetics, cell biology, and biochemistry.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
- IELTS  
  - Total Score: 6.5  
- MELAB  
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

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Information current as of November 07, 2022
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
20 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Ph.D. Written Preliminary Examination: In addition to completing the curriculum for the major and internal related fields, students will be required to pass both a written and oral preliminary examination prior to completing the Ph.D. program. The preliminary written examination will be administered once the student has completed the majority of the required coursework. This will typically occur in the summer of the second year. The written examination will consist of a completed NIH or NSF grant application for the student's proposed research project. The project will be evaluated by the Thesis Examining Committee, which will also serve as the student's Final Oral Examining Committee to provide continuity of advice during the length of the student's research program.

Ph.D. Oral Preliminary Examination: The oral preliminary examination will be administered within two months of the successful completion of the preliminary written examination. The examination will be administered by the graduate faculty according to University regulations and all students will be required to pass the oral examination to continue in the Ph.D. program.

Most students will complete the requirements for the Ph.D. degree within five years. The final oral defense will be conducted by the graduate faculty according to University regulations. It will consist of a public seminar presented by the student.
Integrated Food Systems Leadership Post-baccalaureate Certificate

College of Veterinary Medicine - Adm
Graduate School

Contact Information:
1365 Gortner Ave, St. Paul, MN 55108; 612-624-2459

Program Type: Post-baccalaureate credit certificate/licensure/endorsement
Requirements for this program are current for Fall 2022
Length of program in credits: 12
This program requires summer semesters for timely completion.
Degree: Integrated Food Systems Leadership PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Integrated Food Systems Leadership Post-Baccalaureate Certificate (IFSL Certificate) is a competency-based, interdisciplinary, and cross-collegiate graduate certificate program focusing on developing leadership skills in the context of integrated food systems. The primary objective of the IFSL Certificate is to develop leaders with robust knowledge about the interrelationships among aspects of the global food supply - production, processing, supply chain, regulation, policy, food safety, food security, product development, business and marketing, consumer demands, and communication - in the context of the farm-to-fork food system. The certificate program is ideal for aspiring or new leaders seeking to increase their leadership, expand their food system perspective, take on additional responsibility, and improve effectiveness in their organization. The program focuses on developing leadership and critical thinking skills using a food systems approach while working across disciplines in industry, academia, government agencies, and intergovernmental organizations.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

all degrees acceptable

Other requirements to be completed before admission:
Applicants must be early to mid-career working professionals

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Courses (12 credits)
Take the following courses:
IFSL 7001 - Keys to Authentic and Effective Leadership (2.0 cr)
IFSL 7011 - Food Production Farm to Fork (2.0 cr)
IFSL 7021 - Food Governance, Policy, and Regulation (2.0 cr)
IFSL 7031 - Food Security, Safety, and Defense (2.0 cr)
IFSL 7041 - Food Business, Marketing, and Product Development (2.0 cr)
IFSL 7051 - Leading Across Integrated Food Systems (2.0 cr)
Twin Cities Campus
Molecular, Cellular, Developmental Biology and Genetics M.S.
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED
Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street SE, University of Minnesota, Minneapolis, MN, 55455 (612-624-7470, fax: 612-626-6140)
Email: gcgrad@umn.edu
Website: https://cbs.umn.edu/genetic-counseling/home

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 55
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MCDB&G MS degree offers genetic counseling track that integrates selected coursework with first-hand experience in diagnostic medical genetics laboratories and supervised work in clinical settings with patients and families. Students who pursue the track have the opportunity to participate in the Leadership Education in Neurodevelopmental and Related Disabilities (LEND) program.

Applications to a free-standing research MS degree are not accepted.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Genetic counseling track: http://cbs.umn.edu/genetic-counseling/admissions

Joint MCDBG PhD/Genetic Counseling MS Program: https://cbs.umn.edu/genetic-counseling/program-information/phdprogram

Special Application Requirements:
MS/genetic counseling track:
Experiences where you have developed skills transferable to genetic counseling practice. There are numerous skill-based components of genetic counseling and many ways to develop these skills. For example, you might develop counseling skills by volunteering with people in distress, patient-education skills by working as a teacher or tutor, confidential data management skills from time spent as a research assistant, collaboration/teamwork skills from organizing events, or advocacy skills from helping your family navigate the medical system. In your application, help us see how your experiences will inform your work as a genetic counselor.

Strong understanding of the field of genetic counseling, including the varied roles available to genetic counselors, the dynamics of providing both education and counseling in our work, and current issues/debates. This may be from shadowing experiences, informational interviews, webinars, reading blogs, listening to podcasts, or many other avenues. Application deadline is December 1 for the following fall semester

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 to 55 major credits and 0 credits outside the major. The final exam is written.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Coursework (20 to 30 credits)

Required Coursework (3 credits)
Select 1 of the following courses. GCD 5005: Computer Programming for Cell Biology (Fall) or GCD 8141: Computational Genomics (Spring)
GCD 8141 - Computational Genomics (3.0 cr)
or GCD 5005 - Computer Programming for Biology (3.0 cr)

Electives (17 to 27 credits)

Plan A students take 17 credits, and Plan B students not pursuing the genetics counseling track take 27 credits from the following. Additional coursework may be selected in consultation with the advisor and the director of graduate studies.

MCDG 8900 can be taken for 1 credit up to 4 semesters for a maximum of 4 credits. MCDG 8950 can be taken for 1 credit up to 2 semesters for a maximum of 2 credits. Students pursuing the genetics counseling track exempt from this requirement.

GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
GCD 8171 - Literature Analysis (1.0 - 2.0 cr)
GCD 8401 - Ethics, Public Policy & Careers in Molecular Cell Biology (1.0 cr)
MCDG 8900 - Student Research Seminar (1.0 cr)
MCDG 8950 - Teaching Practicum (1.0 cr)

Plan Options

Plan A
Thesis Credits
Plan A students take at least 10 master's thesis credits.
MCDG 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Joint- or Dual-degree Coursework: MCDBG PhD/Genetic Counseling MS Joint Program
Student may take a total of 21 credits in common among the academic programs.

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Genetic Counseling
This sub-plan is limited to students completing the program under Plan B.

Students must earn a passing grade in the 5 clinical internship rotations.

Students must present a log of at least 50 clinical cases to be eligible for the final written examination.

Students accepted into the Leadership Education in Neurodevelopmental and Related Disabilities (LEND) program must take OLPD 5356 (3 credits) in addition to the genetic counseling track curriculum.

First Year (25 credits)
Students will gain experience in the clinical laboratories one day per week.
Take 2 credits of GCD 8921 (2 semesters; 1 credit each).
Take GCD 8993 for 2 credits.

GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8911 - Introduction to Genetic Counseling Skills and Practice (4.0 cr)
GCD 8912 - Genetic Counseling in Practice (4.0 cr)
GCD 8916 - Genetic Counseling Research Seminar (2.0 cr)
GCD 8917 - Medical Genetics I (3.0 cr)
GCD 8918 - Medical Genetics II (3.0 cr)
GCD 8921 - Professional Development Seminar I (1.0 cr)
GCD 8993 - Directed Studies (1.0 - 5.0 cr)
PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)

Summer (3 credits)
During the summer between the first and second year of the program, students will begin their first clinical internship rotation with patient responsibilities. This clinical rotation includes the expectation that students will spend between 2-3 days per week in the clinic.

GCD 8001 - Genetic Counseling Clinical Internship I (3.0 cr)

Second Year (24 credits)
Students will complete internships in a clinical setting 2-3 days per week.
Take 2 credits of GCD 8922 (2 semesters; 1 credit each).
Take 4 credits of GCD 8994 (2 semesters; 2 credits each).
Students admitted Fall 2020 and later will complete GCD 8914 for 2 credits.

GCD 8002 - Genetic Counseling Clinical Internship II (5.0 cr)
GCD 8003 - Genetic Counseling Clinical Internship III (5.0 cr)
GCD 8913 - Psychosocial Issues in Genetic Counseling I (3.0 cr)
GCD 8914 - Ethical and Legal Issues in Genetic Counseling (2.0 cr)
GCD 8915 - Psychosocial Issues in Genetic Counseling II (3.0 cr)
GCD 8922 - Professional Development Seminar II (1.0 cr)
GCD 8994 - Research (1.0 - 5.0 cr)

LEND Program Participants
Students participating in the Leadership Education in Neurodevelopmental and Related Disabilities (LEND) program complete an additional 3-credit required course. LEND program participants may be advised to complete all 4 credits of GCD 8994 in one semester.

Second Year Required Course (3 Credits)
Take the following course. A Policy & Advocacy module and policy project may be substituted for OLPD 5356 with approval of the director of graduate studies.
OLPD 5356 - Disability Policy and Services (3.0 cr)
Twin Cities Campus

Molecular, Cellular, Developmental Biology and Genetics Minor
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED
Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program
6-160 Jackson Hall, 321 Church Street SE,
University of Minnesota,
Minneapolis, MN  55455 (612-624-7470)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 12
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, Genome Engineering, Stem Cell research and a center for developmental biology provide opportunities for graduate study.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and must meet with the MCDB&G director of graduate studies regarding feasibility, requirements and approval.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses taken for the minor must be graded A-F. A minimum GPA of 3.0 for these courses is required.

Required Coursework (9 credits)
Take the following courses for 9 credits. Other courses may be selected with approval of the MCDB&G director of graduate studies.
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)

Electives (3 credits)
Select at least one of the following courses in consultation with the MCDB&G director of graduate studies.
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus

Molecular, Cellular, Developmental Biology and Genetics Ph.D.

Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED

Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street SE, University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48 to 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, genome engineering, stem cell research, and a center for developmental biology provide opportunities for graduate study.

PhD students are admitted to MCDB&G under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first-year program administered by the MCDB&G and the Biochemistry, Molecular Biology and Biophysics (BMBB) graduate programs. After the first year, students select either MCDB&G or BMBB to complete their degree. MCDB&G does NOT have a freestanding master's program.

The MCDB&G PhD is also part of three joint degree programs: The Joint Degree Program in Law, Health, and Life Sciences, the MD/PhD program, and the MS Genetic Counseling/MCDBG PhD Program.

The Joint Degree Program in Law, Health, and Life Sciences is unique in the nation and enables students to combine a JD degree with a PhD or MS degree. Students entering this program must be admitted to both the MCDB&G program and the Law School. Admission qualifications for MS and PhD students are identical; only the student's career objectives distinguish the degree that they pursue.

The MD/PhD program emphasizes the integration of the two major components of training--medicine and research--to ensure excellence in both. The program features a special curriculum that facilitates the transition from Medical School to the first year of formal graduate training and the transition from graduate training back to Medical School.

The PhD/MS in genetic counseling program emphasizes the integration of clinical genetics and research--to ensure excellence in both. The program features a special curriculum that facilitates the transition from the first year of formal graduate training and the transition from graduate training in genetic counseling back to Medical School. Students need to apply to both programs and be accepted by both admission committees.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.50.

Applications from students with an undergraduate or master's degree in the biological, chemical, or physical sciences are preferred.

Other requirements to be completed before admission:

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Recommended academic preparation includes coursework in molecular biology, genetics, biology, and biochemistry. Successful applicants must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate familiarity with and aptitude for basic science research prior to embarking on a graduate career in this program.

**Special Application Requirements:**
Applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, and a complete set of transcripts (copies are accepted) are required. GRE General and Subject scores are NOT required. The deadline for receipt of completed applications is December 1st. Graduate studies begin fall semester only.

Entry into the J.D./Ph.D. program requires separate admittance to both the Law School and the MCDB&G Graduate Program. Entry into the M.D./Ph.D. program requires separate admittance to both the Medical School and the MCDB&G Graduate Program. Entry into the MS Genetic Counseling/MCDB&G Ph.D. program requires separate admittance to both the Genetic Counseling Program and the MCDB&G Graduate Program.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
- **IELTS**
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
24 to 39 credits are required in the major.
0 credits are required outside the major.
24 to 39 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Additional requirements include:
Weekly attendance at MCDB&G student seminars.
Weekly attendance at GCD departmental seminars.
Presentation at an MCDB&G student seminar in the 2nd, 3rd, and 4th year of study for a total of 3 times.
Completion of a TA assignment in the 2nd and 3rd years of study for a total of 2 times.

**Required Coursework (15-18 credits)**
Take the following required courses for MCDBG.

**Core Courses (10-13 credits)**
- **GCD 8151** - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- **GCD 8131** - Advanced Molecular Genetics and Genomics (3.0 cr)
- **GCD 8161** - Advanced Cell Biology and Development (2.0 cr)
- **GCD 8171** - Literature Analysis (1.0 - 2.0 cr)
- **MCDG 8920** - Special Topics (1.0 - 4.0 cr)

**Computer Programming/Computational Genomics (3 credits)**
Take at least one of the following courses.
- **GCD 5005** - Computer Programming for Biology (3.0 cr)
or **GCD 8141** - Computational Genomics (3.0 cr)

**Ethics (1 credit)**

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Choose one of the following courses.

**GCD 8401 - Ethics, Public Policy & Careers in Molecular Cell Biology (1.0 cr)**

**or BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)**

**Student Seminar (1 credit)**

Choose one of the following courses.

MCDG 8900 can be taken for one credit up to four times (over four semesters).

**MCDG 8900 - Student Research Seminar (1.0 cr)**

**or BIOC 8084 - Research and Literature Reports (1.0 cr)**

**Electives**

Select electives from the following list in consultation with the advisor and the director of graduate studies to satisfy minimum coursework requirements.

**BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)**

**BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)**

**BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)**

**BIOC 5444 - Muscle (3.0 cr)**

**BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)**

**BIOC 5535 - Introduction to Modern Structural Biology -- Diffraction (2.0 cr)**

**BIOC 5536 - Introduction to Modern Structural Biology - Nuclear Magnetic Resonance (2.0 cr)**

**BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)**

**BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)**

**BIOC 8005 - Biochemistry: Structure and Catalysis (2.0 cr)**

**BIOC 8006 - Biochemistry: Metabolism and Control (2.0 cr)**

**BIOC 8007 - Molecular Biology of the Genome (2.0 cr)**

**BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)**

**BIOC 8184 - Graduate Seminar (1.0 cr)**

**CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)**

**CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)**

**CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)**

**CSCI 8900 - Student Research Seminar (1.0 - 2.0 cr)**

**GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)**

**GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)**

**GCD 8111 - Quantitative Fluorescence Microscopy (3.0 cr)**

**GCD 8900 - Seminar (1.0 - 2.0 cr)**

**GRAD 8101 - Teaching in Higher Education (3.0 cr)**

**GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)**

**MATH 8250 - Topics in Mathematical Biology (1.0 - 3.0 cr)**

**MCDG 8950 - Teaching Practicum (1.0 cr)**

**MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)**

**MICA 8003 - Immunity and Immunopathology (4.0 cr)**

**MICA 8004 - Cellular and Cancer Biology (4.0 cr)**

**NSC 8211 - Developmental Neurobiology (4.0 cr)**

**OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)**

**PHCL 5111 - Pharmacogenomics (3.0 cr)**

**PUBH 6450 - Biostatistics I (4.0 cr)**

**SCB 8181 - Stem Cell Biology (3.0 cr)**

**STAT 5021 - Statistical Analysis (4.0 cr)**

**Thesis Credits**

Take at least 24 doctoral thesis credits.

**MCDG 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**

**Joint- or Dual-degree Coursework:** Joint Degree Program in Law, Science and Technology (JD/PhD), Medical Scientist Training Program (MD/PhD), MS Genetic Counseling/MCDB&G PhD Joint Program. Student may take a total of 12 credits in common among the academic programs.

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Biology Education**

In addition to the required MCDB&G PhD coursework, students pursuing the Biology Education track must take Biology Education core and elective courses.

**Biology Education Core (9 credits)**
Students pursuing the Biology Education track must take the following core courses:

**CI 8134** - Foundations of Research in Curriculum and Instruction I (3.0 cr)
**CI 8135** - Foundations of Research in Curriculum and Instruction II (3.0 cr)
**EPSY 8251** - Statistical Methods in Education I (3.0 cr)

**Curriculum Instruction (3 credits)**
Take at least one of the following:

- **CI 8145** - Using Mixed Methods in Educational Research (3.0 cr)
- **CI 8147** - Critical Discourse Analysis in Educational Research (3.0 cr)
- **CI 8149** - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- **CI 8571** - Equity, Policy, and Social Justice in Science Education (3.0 cr)
- **CI 8572** - Learning Theory and Classical Research in STEM Education (3.0 cr)

**Biology Education Electives (3 credits)**
Take at least one elective course, selected in consultation with the advisor and director of graduate studies.

- **EPSY 8226** - Item Response Models: Theory and Applications (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)
- **EPSY 8265** - Factor Analysis (3.0 cr)
- **EPSY 8266** - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- **EPSY 8267** - Applied Multivariate Analysis (3.0 cr)
- **EPSY 8268** - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- **EPSY 8282** - Statistical Analysis of Longitudinal Data (3.0 cr)
- **CI 8145** - Using Mixed Methods in Educational Research (3.0 cr)
- **CI 8147** - Critical Discourse Analysis in Educational Research (3.0 cr)
- **CI 8149** - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- **CI 8571** - Equity, Policy, and Social Justice in Science Education (3.0 cr)
- **CI 8572** - Learning Theory and Classical Research in STEM Education (3.0 cr)
Twin Cities Campus
Water Resources Science M.S.
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, University of Minnesota, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- University of Minnesota, Duluth
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of interest: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. A Limnology and Oceanography track is also offered. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Plant Biology; and Soil, Water, and Climate. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; and Physics; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a bachelor's degree in physical, biological, or environmental science or engineering.

Other requirements to be completed before admission:
Recommended academic preparation includes at least two courses each in calculus, chemistry, and physics, at least one course in the biological sciences, and some experience or background in statistics.

Availability of funding and willingness of a member of the graduate faculty to serve as an advisor are important criteria for admission to the program.

Special Application Requirements:
Applicants must submit three letters of recommendation via the University of Minnesota's online application system. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE General Test. Students may be admitted any semester but are strongly encouraged to submit their application by December 1 for fall semester admission. More specific application instructions can be found on the program website: https://wrs.umn.edu/prospective-students.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 22 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is defined by the faculty advisor. The Plan B option is well suited to students who have little undergraduate course work in water resources science and thus need more coursework to gain the combination of depth and breadth needed in this field. Plan B projects involve field, laboratory, or computer work and the analysis, synthesis, or interpretation of data.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students with WRS-equivalent core courses taken as undergraduates may substitute other classes to meet program requirements, with adviser approval.

**Water Resources Seminar**

- WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 cr)

**Water Resources Ethics**

- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Hydrology Core**

- Take at least 3 credits from the following:
  - BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
  - or CEGE 4501 - Hydrologic Design (4.0 cr)
  - or ESCI 4702 - General Hydrogeology (4.0 cr)
  - or FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
  - or FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)

**Environmental/Water Chemistry Core**

- Take at least 3 credits from the following:
  - CEGE 5541 - Environmental Water Chemistry (3.0 cr)
  - or ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
  - or ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
  - or LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
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</table>
Plan A Option:
Take 10 or more credit(s) from the following:

- WRS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B Option
Select additional courses in consultation with your advisor to complete the Plan B option.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Limnology and Oceanography
The science of inland waters, or "limnology," includes the study of streams, lakes, ponds, and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes the study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology.

A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical and chemical sciences. Such interdisciplinary fields in the modern research university require mechanisms to ensure cross-fertilization of ideas, approaches, methods, techniques, and knowledge. The limnology and oceanography track in WRS provides just such a much-needed mechanism. The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography.

Students with WRS-equivalent coursework taken as undergraduates may substitute other classes to meet minimum credit requirements.

The faculty advisor must be a member of the limnology and oceanography track faculty.

Water Resources Seminar
WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 cr)

Water Resources Ethics
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Hydrology Core for Limnology/Oceanography Students
Take at least 3 credits from the following:
BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
or FNRM 5114 - Hydrology and Watershed Management (3.0 cr)

Environmental/Water Chemistry Core for Limnology/Oceanography Students
Take at least 3 credits from the following:
CEGE 5541 - Environmental Water Chemistry (3.0 cr)
or EEB 4611 - Biogeochemical Processes (3.0 cr)
or ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
or ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
or LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

Limnology Core
### EEB 5601 - Limnology (3.0 cr)
### Water Resources Policy Core
### WRS 5101 - Water Policy (3.0 cr)

#### WRS Electives
Plan A students select at least 9 credits, and Plan B students select at least 17 credits from the following list and in consultation with the L&O committee.

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PMB 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
SOIL 5232 - Vadose Zone Hydrology (3.0 cr)
SOIL 5555 - Wetland Soils (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
WRS 5150 - Watershed Specialist Training (2.0 cr)

**Plan A Option:**
Take 10 or more credit(s) from the following:
• WRS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B Option**
Select additional courses in consultation with your advisor to compete the Plan B option.
Twin Cities Campus
Water Resources Science Minor
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- University of Minnesota Duluth

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. The minor benefits from a set of core courses plus electives in the following areas of interest: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management.

The goal of the WRS program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Course
WRS 5101 - Water Policy (3.0 cr)

Electives
- Master's students must take at least 6 credits, and doctoral students must take at least 9 credits from the following list of electives.
  - BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
  - CEGE 4501 - Hydrologic Design (4.0 cr)
  - CEGE 5541 - Environmental Water Chemistry (3.0 cr)
  - EEB 5601 - Limnology (3.0 cr)
  - ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
  - ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Water Resources Science PhD
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- The Water Resources Science PhD is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Water Resources Science PhD program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of interest: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. A Limnology and Oceanography track is also offered. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Plant Biology; and Soil, Water, and Climate. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; and Physics; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a master's degree in physical, biological, or environmental science or engineering.

Other requirements to be completed before admission:
Recommended academic preparation includes at least two courses each in calculus, chemistry, and physics, at least one course in the biological sciences, and some experience or background in statistics.

Availability of funding and willingness of a member of the graduate faculty to serve as an advisor are important criteria for admission to the PhD program.
Special Application Requirements:
Applicants must submit three letters of recommendation via the University of Minnesota's online application system. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Students may be admitted any semester but are strongly encouraged to submit their application by December 1 for fall semester admission. More specific application instructions can be found on the program website: https://wrs.umn.edu/prospective-students.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Water Resources Seminar
Students must take WRS 8100 for 0.5 credits.
- WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 cr)

Water Resources Ethics
- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Hydrology Core
Take at least 3 credits from the following:
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- ESCI 4702 - General Hydrogeology (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)

Environmental/Water Chemistry Core
Take at least 3 credits from the following:
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)

Limnology Core
- EEB 5601 - Limnology (3.0 cr)

Water Resources Policy Core
WRS 5101 - Water Policy (3.0 cr)

WRS Electives
Select electives from the following list to complete the 24 course credits required:

AGRO 5121 - Applied Experimental Design (4.0 cr)
BBE 5513 - Watershed Engineering (3.0 cr)
BBE 5523 - Ecological Engineering Design (3.0 cr)
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
CEGE 4351 - Groundwater Mechanics (3.0 cr)
CEGE 4352 - Groundwater Modeling (3.0 cr)
CEGE 4501 - Hydrologic Design (4.0 cr)
CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
CEGE 4511 - Hydraulic Structures (3.0 cr)
CEGE 4512 - Open Channel Hydraulics (4.0 cr)
CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
CEGE 5541 - Environmental Water Chemistry (3.0 cr)
CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CEGE 8506 - Stochastic Hydrology (4.0 cr)
CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)
CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
EEB 4611 - Biogeochemical Processes (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
EEB 8601 - Introduction to Stream Restoration (3.0 cr)
EEB 8602 - Stream Restoration Practice (2.0 cr)
ENT 5121 - Applied Experimental Design (4.0 cr)
ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
ESCI 5971 - Field Hydrogeology (2.0 cr)
ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
ESCI 8602 - Stream Restoration Practice (2.0 cr)
ESPM 4216 - Contaminant Hydrology (3.0 cr)
ESPM 5015 - Invasive Plants and Animals: Ecology and Management (3.0 cr)
ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
ESPM 5402 - Biometeorology (3.0 cr)
ESPM 5555 - Wetland Soils (3.0 cr)
ESPM 5575 - Wetlands (3.0 cr)
FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FW 4136 - Ichthyology (4.0 cr)
FW 5459 - Stream and River Ecology (3.0 cr)
FW 8459 - Stream and River Ecology (3.0 cr)
FW 8465 - Fish Habitats and Restoration (3.0 cr)
GEOG 5426 - Climatic Variations (3.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
NR 5021 - Statistics for Agricultural and Natural Resource Professionals (3.0 cr)
Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Limnology and Oceanography
The science of inland waters, or "limnology," includes the study of streams, lakes, ponds, and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology. A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical, and chemical sciences.

This track within the cross-campus interdisciplinary WRS program provides comprehensive training in limnology and oceanography. As is the case for the WRS graduate program as a whole, the L&O program includes a set of core courses plus electives in the subfield of limnology and oceanography.

The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography. Faculty on both Twin Cities and Duluth campuses participate in the limnology and oceanography track.

PhD students pursuing the limnology and oceanography track must have at least two members of the limnology and oceanography faculty on their committee, including the advisor.

Water Resources Seminar
Students must take WRS 8100 for 0.5 credits.

WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 cr)

Water Resources Ethics
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Hydrology Core for Limnology/Oceanography Students
Take 3 or more credit(s) from the following:
• BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)

Environmental/Water Chemistry Core for Limnology/Oceanography Students
Take at least 3 credits from the following:
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
  or EEB 4611 - Biogeochemical Processes (3.0 cr)
  or ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
  or ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
  or LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
  or PUBH 6190 - Environmental Chemistry (3.0 cr)

Limnology Core
EEB 5601 - Limnology (3.0 cr)

Water Resources Policy Core
WRS 5101 - Water Policy (3.0 cr)

WRS Electives
Select electives from the following list, in consultation with the L&O committee, to complete the 24 course credits required:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• BBE 5513 - Watershed Engineering (3.0 cr)
• BBE 5523 - Ecological Engineering Design (3.0 cr)
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</tr>
<tr>
<td>PMB 4121</td>
<td>Microbial Ecology and Applied Microbiology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PUBH 6190</td>
<td>Environmental Chemistry</td>
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</tr>
<tr>
<td>PUBH 6450</td>
<td>Biostatistics I</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PUBH 6451</td>
<td>Biostatistics II</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOIL 5232</td>
<td>Vadose Zone Hydrology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>SOIL 5555</td>
<td>Wetland Soils</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 5021</td>
<td>Statistical Analysis</td>
<td>4.0 cr</td>
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</tbody>
</table>
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
WRS 5150 - Watershed Specialist Training (2.0 cr)

**Thesis Credits**

Take at least 24 doctoral thesis credits.

WRS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Development Practice M.D.P.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002).
Email: hhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 50
- This program requires summer semesters for timely completion.
- Degree: Master of Development Practice

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Development Practice masters degree (MDP), jointly administered by the Humphrey School of Public Affairs and the Interdisciplinary Center for the Study of Global Change, prepares students for careers in sustainable development. The degree provides a rigorous, interdisciplinary education and equips students with the competencies, skills, and knowledge needed to work toward poverty alleviation and sustainable development in developing regions of the world.

The MDP provides training in policy analysis and management, health and education, natural sciences, social sciences, and interdisciplinary research methods.

The Minnesota MDP program and degree are part of a global association of MDP programs.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
A strong liberal education background, and sound quantitative and analytical skills are preferred.

Previous coursework in mathematics, statistics, and economics is recommended. Applicants needing to strengthen this part of their skill set prior to admission may wish to take introductory microeconomics, college algebra, and/or introductory statistics courses.

International professional experience and foreign language competency are strongly preferred.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores, at least three letters of recommendation, and an optional diversity statement.

For M.D.P. applicants applying for the Fall 2023 cohort, GRE scores are not required. We request that applicants not submit them as they will not be weighed as part of the admissions process.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 50 major credits and up to null credits outside the major. The final exam is optional. A capstone project is required.

**Capstone Project:** A team project (MDP 5200), conducted in consultation with the workshop advisor and an NGO or public-sector client, is completed during the second year of study.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A team project (MDP 5004), conducted in consultation with a faculty advisor and an NGO or public-sector client, is completed during the summer following the first year of study. Projects are place-based, and typically occur in an international context over a 10-week period. Additional cost for the field experience project is the responsibility of the student.

All courses must be taken in consultation with the advisor.

**Core Courses (21 credits)**

Take the following courses. Courses offered on both the A-F and S/N grade basis must be taken A-F.

- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- **MDP 5001** - Ways of Knowing for Sustainable Development (2.0 cr)
- **MDP 5002** - Program Development Workshop (3.0 cr)
- **MDP 5005** - Qualitative Methods for Development Practice (3.0 cr)
- **PA 5501** - Theories and Policies of Development (3.0 cr)
- **PA 5503** - Economics of Development (3.0 cr)
- **PA 5521** - Development Planning and Policy Analysis (4.0 cr)

**Statistics Course (4 credits)**

Select 1 of the following courses in consultation with the advisor. Courses offered on both the A-F and S/N grade basis must be taken A-F.

- **PA 5031** - Statistics for Public Affairs (4.0 cr)
- **PA 5045** - Statistics for Public Affairs, Accelerated (4.0 cr)

**Additional Methods Course (1 course)**

Select at least 1 course (variable credit requirement) from the following in consultation with the advisor. Courses offered on both the A-F and S/N grade basis must be taken A-F.

- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **OLPD 5501** - Principles and Methods of Evaluation (3.0 cr)
- **PA 5003** - Introduction to Financial Analysis and Management (1.5 cr)
- **PA 5032** - Applied Regression (2.0 cr)
- **PA 5044** - Applied Regression, Accelerated (2.0 cr)
- **PA 5311** - Program Evaluation (3.0 cr)

**International Education Course (3 credits)**

Select 1 of the following courses in consultation with the advisor. Courses offered on both the A-F and S/N grade basis must be taken A-F.

- **OLPD 5104** - Strategies for International Development of Education Systems (3.0 cr)
- **OLPD 5107** - Gender, Education, and International Development (3.0 cr)

**Environmental Science Course (3 credits)**

Select 1 of the following courses in consultation with the advisor. Courses offered on both the A-F and S/N grade basis must be taken A-F.
GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
GCC 5032 - Ecosystems Health: Leadership at the intersection of humans, animals and the environment [ENV] (3.0 cr)
GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
PA 5751 - Addressing Climate and Energy Challenges at the Local Scale (3.0 cr)

**Leadership and Management Course (3 credits)**
Take the following course. Courses offered on both the A-F and S/N grade basis must be taken A-F.
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)

**Public Health Course (2 credits)**
Select 1 of the following courses in consultation with the advisor. Courses offered on both the A-F and S/N grade basis must be taken A-F.
PUBH 6108 - Foundations of Global Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

**Practicum Experiences (7 credits)**
Take the following courses. Courses offered on both the A-F and S/N grade basis must be taken A-F.
MDP 5004 - International Field Experience (3.0 cr)
MDP 5000 - Post-Field / Pre-Capstone Seminar (1.0 cr)
MDP 5200 - Capstone Workshop in Development Practice (3.0 cr)

**Electives**
Select elective credits, in consultation with the advisor, to meet the 50-credit minimum. Other courses, including courses from the above lists not being used to satisfy degree requirements, may be applied with advisor approval.
ANTH 8120 - Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)
ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
ESPM 5108 - Ecology of Managed Systems (4.0 cr)
ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
GEOG 5385 - Globalization and Development: Political Economy (4.0 cr)
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
HORT 5071 - Ecological Restoration (4.0 cr)
OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 8101 - International Education and Development (3.0 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5414 - [Inactive](3.0 cr)
PA 5522 - International Development Policy, Families, and Health (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
Twin Cities Campus
Development Practice Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8 to 9
- Length of program in credits (Doctorate): 12 to 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Development Practice minor offers three options for students interested in an international/sustainable development practice credential. The field experience option incorporates coursework and a summer field experience; the capstone option incorporates coursework and an experiential capstone component; and the coursework option concentrates on coursework that provides students with academic preparation in international/sustainable development practice.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Development Practice director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minimum cumulative GPA for minor field coursework is 3.00.

Required Course (2 credits)
All students take the following course:
MDP 5001 - Ways of Knowing for Sustainable Development (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Options
Students select the Field Experience, Capstone, or Coursework option, in consultation with the Development Practice director of
graduate studies, to complete the master's minor.

**Field Experience (6 credits)**
Take the following courses:
- MDP 5002 - Program Development Workshop (3.0 cr)
- MDP 5004 - International Field Experience (3.0 cr)

-OR-

**Capstone (7 credits)**
Take the following courses:
- MDP 5002 - Program Development Workshop (3.0 cr)
- MDP 5100 - Post-Field / Pre-Capstone Seminar (1.0 cr)
- MDP 5200 - Capstone Workshop in Development Practice (3.0 cr)

-OR-

**Coursework (6 credits)**
Select at least 6 credits from the following in consultation with the Development Practice director of graduate studies:

**Required Course (3 credits)**
Take the following course:
- PA 5501 - Theories and Policies of Development (3.0 cr)

**Electives (3 credits)**
Select at least 3 credits from the following in consultation with the Development Practice director of graduate studies:
- PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
- PA 5503 - Economics of Development (3.0 cr)
- PA 5504 - Transforming Development (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)

**Doctoral Options**
Students select Field Experience, Capstone, or Coursework option, in consultation with the Development Practice director of graduate studies, to complete the doctoral minor.

**Field Experience (10 credits)**
**Required Courses (6 credits)**
Take the following courses:
- MDP 5002 - Program Development Workshop (3.0 cr)
- MDP 5004 - International Field Experience (3.0 cr)

**Electives (4 credits)**
Select at least 4 credits from the following in consultation with the Development Practice director of graduate studies.
- PA 5503 - Economics of Development (3.0 cr)
- PA 5504 - Transforming Development (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 8151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
- PA 8302 - Applied Policy Analysis (4.0 cr)

**Capstone (11 credits)**
**Required Courses (7 credits)**
Take the following courses:
- MDP 5002 - Program Development Workshop (3.0 cr)
- MDP 5100 - Post-Field / Pre-Capstone Seminar (1.0 cr)
- MDP 5200 - Capstone Workshop in Development Practice (3.0 cr)

**Electives (4 credits)**
Select at least 4 credits from the following, in consultation with the Development Practice director of graduate studies.
- PA 5503 - Economics of Development (3.0 cr)
- PA 5504 - Transforming Development (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 8151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
- PA 8302 - Applied Policy Analysis (4.0 cr)
- PA 8601 - Global Survey of Gender and Public Policy (3.0 cr)

**Coursework (10 credits)**
**Required Course (3 credits)**
Take the following course:
PA 5501 - Theories and Policies of Development (3.0 cr)

**Electives (7 credits)**
Select at least 7 credits from the following in consultation with the Development Practice director of graduate studies.
PA 5503 - Economics of Development (3.0 cr)
PA 5504 - Transforming Development (3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)
PA 8151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PA 8601 - Global Survey of Gender and Public Policy (3.0 cr)
Twin Cities Campus
Early Childhood Policy Postbaccalaureate Certificate
HHH Social Policy Academic Program
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Humphrey School of Public Affairs, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• Degree: Early Childhood Policy PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Early Childhood Policy post-baccalaureate certificate gives students expertise in applying research-based knowledge to public policies affecting young children and the adults who care for them. The certificate provides a vehicle for students to gain fundamental early childhood policy skills and knowledge and to foster connection between the University of Minnesota and the early childhood policy community. Students may have opportunities to participate in the work of the Institute of Child Development's Human Capital Research Collaborative.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission is available for fall or spring semester. A complete application will include a University of Minnesota application, personal statement, resume or C.V., and transcripts.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.

A maximum of 1/3 of the course credits may be S/N, excluding courses only offered on the S/N grade basis.

Early Childhood and Public Policy Course (1.5 to 3 credits)
Select the following course for 1.5 or 3 credits, in consultation with the advisor:
PA 5413 - Early Childhood and Public Policy (1.5 - 3.0 cr)

Electives (9 to 10.5 credits)
Topics courses, if selected, must cover early childhood. Advisor approval is required.
Policy Electives (1.5 to 3 credits)
Select credits from the following in consultation with the advisor. Other courses can be selected with advisor approval.
FSOS 8104 - Family Policy Seminar (3.0 cr)
PA 5415 - Effective Policies for Children in the First Decade (1.5 - 3.0 cr)
PA 5442 - Education Law and Policy (3.0 cr)
PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
SW 5101 - Historical Origins and Contemporary Policies in Social Welfare (3.0 cr)
SW 8804 - Child Welfare Policy (3.0 cr)

**Additional Electives**
Select credits from the following in consultation with the advisor to complete the 12-credit minimum. Other courses can be selected with advisor approval.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CI 8900</td>
<td>Family, Youth, and Community Colloquium (1.0 - 4.0 cr)</td>
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<tr>
<td>CPSY 5251W</td>
<td>Social and Philosophical Foundations of Early Childhood Education [WI] (3.0 cr)</td>
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<tr>
<td>CPSY 5252</td>
<td>Facilitating Social and Emotional Learning in Early Childhood Education (3.0 cr)</td>
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<tr>
<td>CPSY 5253</td>
<td>Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)</td>
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<tr>
<td>CPSY 5254</td>
<td>Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)</td>
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<tr>
<td>EPSY 5221</td>
<td>Principles of Educational and Psychological Measurement (3.0 cr)</td>
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<td>EPSY 5243</td>
<td>Principles and Methods of Evaluation (3.0 cr)</td>
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<td>EPSY 5625</td>
<td>Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)</td>
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<td>EPSY 5849</td>
<td>Multi-tiered Systems of Support in Early Childhood Education (3.0 cr)</td>
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<tr>
<td>FSOS 8106</td>
<td>Seminar: Families From an Economic Perspective (3.0 cr)</td>
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<td>NURS 5032</td>
<td>Human Response to Health and Illness: Children and Childbearing Families (5.0 cr)</td>
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<td>OLPD 5346</td>
<td>Politics of Education (3.0 cr)</td>
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<td>OLPD 5356</td>
<td>Disability Policy and Services (3.0 cr)</td>
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<td>OLPD 5501</td>
<td>Principles and Methods of Evaluation (3.0 cr)</td>
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<td>OLPD 8015</td>
<td>Inquiry strategies in educational and organizational research (3.0 cr)</td>
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<td>OLPD 8016</td>
<td>Research Design and Educational Policy (3.0 cr)</td>
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<td>OLPD 8087</td>
<td>Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)</td>
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<td>OLPD 8095</td>
<td>Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)</td>
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<td>OLPD 8302</td>
<td>Educational Policy Perspectives (3.0 cr)</td>
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<td>PA 5311</td>
<td>Program Evaluation (3.0 cr)</td>
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<td>PA 5480</td>
<td>Topics in Race, Ethnicity, and Public Policy (1.0 - 3.0 cr)</td>
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<td>POL 8602</td>
<td>Families, Children, and the State (3.0 cr)</td>
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<td>PUBH 6606</td>
<td>Children's Health: Life Course and Equity Perspectives (2.0 cr)</td>
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<td>PUBH 6607</td>
<td>Adolescent Health: Issues, Programs, and Policies (2.0 cr)</td>
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<td>PUBH 6613</td>
<td>Children and Youth With Special Health Care Needs (2.0 cr)</td>
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<td>PUBH 6630</td>
<td>Foundations of Maternal and Child Health Leadership (3.0 cr)</td>
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<td>SW 5905</td>
<td>Permanency in Child Welfare (2.0 cr)</td>
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<tr>
<td>SW 8363</td>
<td>Social Work in Child Welfare (3.0 cr)</td>
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Twin Cities Campus
Election Administration Postbaccalaureate Certificate
HHH Politics and Governance Academic Program
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Humphrey School of Public Affairs, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Election Administration PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Election Administration post-baccalaureate certificate prepares professional election officials across the country for advancement in the field as well as students interested in entering the field of election administration. Students will acquire and develop the skills and knowledge of election operations and procedures. All courses are offered in an online format and include topics such as election law, election security, data analysis, and voter participation.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission is available for fall or spring semester. The application must include a University of Minnesota application, personal statement, resume or C.V., and transcripts.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.

A maximum of 1/3 of the course credits may be S/N, excluding courses only offered on the S/N grade basis.

Core Courses (7 credits)
Take the following courses:
PA 5971 - Survey of Election Administration (3.0 cr)
PA 5972 - Elections and the Law (2.0 cr)
PA 5973 - Strategic Management of Election Administration (2.0 cr)

Electives (5 credits)
Select at least 5 credits from the following in consultation with the advisor:
- PA 5975 - Election Design (2.0 cr)
- PA 5976 - Voter Participation (1.0 cr)
- PA 5982 - Data Analysis for Election Administration (2.0 cr)
- PA 5983 - Introduction to Election Security (1.0 cr)
- PA 5984 - Elections Security: How to Protect America's Elections (2.0 cr)
- PA 5985 - Physical Election Security (2.0 cr)
Human Services Leadership Postbaccalaureate Certificate

HHH Leadership and Management Academic Program
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Admissions are being paused for the 2022-2023 academic year.

Human service professionals face extraordinary challenges that require innovative thinking and an interdisciplinary approach. The Human Services Leadership post-baccalaureate certificate, designed in collaboration with field leaders, is intended for working professionals involved in human service program development and delivery. The curriculum offers knowledge and skills in leadership, public policy and implementation, and public service redesign to enhance advancement potential for mid- to senior-level leadership positions in county, state, and nonprofit agencies.

Program Delivery
This program is available:
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Special Application Requirements:
At least 8 years of post-baccalaureate professional work experience. Pre-baccalaureate experience may be considered for applicants with a significant gap between completion of high school and the bachelor's degree.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.

A maximum of 1/3 of the course credits may be S/N, excluding courses only offered on the S/N grade basis.

Required Coursework (6 credits)
Take the following courses:
PA 5161 - Redesigning Human Services (3.0 cr)
PA 5162 - Public Service Redesign Workshop (3.0 cr)
Elective Courses (6 credits)
Select 6 credits from the following in consultation with the advisor. If PA 5190 Topics is selected, the topic must be Leading Across Boundaries or Collaborative Governance. Other courses can be selected with approval of the advisor and director of graduate studies.

PA 5011 - Management of Organizations (3.0 cr)
PA 5103 - Leadership and Change (1.5 - 3.0 cr)
PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
PA 5137 - Project Management in the Public Arena (1.5 cr)
PA 5145 - Civic Participation in Public Affairs (3.0 cr)
PA 5190 - Topics in Public and Nonprofit Leadership and Management (1.0 - 3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5405 - Public Policy Implementation (3.0 cr)
PA 5421 - Racial Inequality and Public Policy (3.0 cr)
PA 5927 - Effective Grantwriting for Nonprofit Organizations (1.5 cr)
OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
Nonprofit Management Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002).
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Nonprofit Management PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Nonprofit Management post-baccalaureate certificate is designed particularly for those individuals, whether students or working professionals, who want to pursue or further advance their careers in managing or leading a nonprofit organization. Students acquire knowledge and skills in effective leadership and management, organizational development, nonprofit governance, strategic planning, policy analysis, human resource development, finance, and fundraising.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited institution.

Other requirements to be completed before admission:
At least 2 years of experience as a paid or volunteer staff member with nonprofit organizations.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., and transcripts.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.
Application of 4xxx-level coursework requires pre-approval of the advisor and director of graduate studies.

A maximum of 1/3 of the course credits may be S/N, excluding courses only offered on the S/N grade basis.

Required Core Courses (7.5 credits)
Take the following courses. All required core courses must be taken A-F.
PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5251 - Strategic Planning and Management (3.0 cr)

Electives
Select courses, in consultation with the advisor, to meet the 13-credit minimum. Other courses can be applied as electives with advisor approval.
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 8703 - Public Policy in Higher Education (3.0 cr)
PA 5103 - Leadership and Change (1.5 - 3.0 cr)
PA 5104 - Strategic Human Resource Management (3.0 cr)
PA 5108 - Board leadership development (1.0 cr)
PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
PA 5116 - Financing Public and Nonprofit Organizations (1.5 cr)
PA 5123 - Philanthropy in America: History, Practice, and Trends (1.5 - 3.0 cr)
PA 5135 - Managing Conflict: Negotiation (3.0 cr)
PA 5144 - Social Entrepreneurship (3.0 cr)
PA 5145 - Civic Participation in Public Affairs (3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 5190 - Topics in Public and Nonprofit Leadership and Management (1.0 - 3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5405 - Public Policy Implementation (3.0 cr)
PA 5920 - Skills Workshop (0.5 - 4.0 cr)
PA 5927 - Effective Grantwriting for Nonprofit Organizations (1.5 cr)
PUBH 6557 - Health Finance I (3.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
SW 5562 - Global Social Work and Social Development (3.0 cr)
SW 5904 - Facilitation and Conflict Management: Humanistic Approach (2.0 cr)
SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)
SW 8552 - Advanced Community Practice: Leadership, Planning, and Program Development (3.0 cr)
SW 8563 - Advanced Policy Advocacy (3.0 cr)
SW 8804 - Child Welfare Policy (3.0 cr)
SW 8805 - Aging and Disability Policy (3.0 cr)
SW 8806 - Health and Mental Health Policy (3.0 cr)
SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)
Twin Cities Campus
Policy Issues on Work and Pay Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Policy Issues on Work and Pay PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Policy Issues in Work and Pay post-baccalaureate certificate provides an understanding of, and the ability to evaluate and develop, federal, state, and local policies that affect the employment relationship. Students learn about the role of government in the employment relationship, including statutes, and how employers, unions, and the government interpret and utilize policies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Mathematics courses at least through algebra; a one-semester course in microeconomics.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.
A maximum of 1/3 of the course credits may be S/N, excluding courses only offered on the S/N grade basis.

**Required Courses (6 credits)**
- Public Policies on Work and Pay (3 credits)
  - Select 1 of the following courses in consultation with the advisor:
    - PA 5431 - Public Policies on Work and Pay (3.0 cr)
    - HRIR 5655 - Public Policies on Work and Pay (3.0 cr)

**Social Safety Nets/Social Insurance Programs (3 credits)**
- PA 5416 - Economics of U.S. Social Insurance Programs (3.0 cr)

**Electives (9 credits)**
Select 9 credits from the following in consultation with the advisor. Other courses may be chosen with director of graduate studies approval.
- APEC 5511 - Labor Economics (3.0 cr)
- HRIR 5222 - Creating and Managing Diversity and Inclusion (2.0 cr)
- HRIR 5252 - Employment and Labor Law for the HRIR Professional (2.0 cr)
- HRIR 5662 - Personnel Economics (2.0 cr)
- HRIR 6503 - Employer-Sponsored Employee Benefit Programs (2.0 cr)
- HRIR 6701 - Labor Relations and Collective Bargaining (4.0 cr)
- LAW 6203 - Labor Law (3.0 cr)
- LAW 6631 - Employment Discrimination (3.0 cr)
- LAW 6632 - Employment Law (3.0 cr)
- LAW 6833 - Alternative Dispute Resolution (3.0 cr)
- PA 5023 - Stratification Economics and Public Policy (2.0 cr)
- PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
- PA 5512 - Workforce and Economic Development (3.0 cr)
- PA 8386 *(Inactive)* (2.0 cr)
Twin Cities Campus
Public Affairs Leadership Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Public Affairs Leadership PBac Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Affairs Leadership post-baccalaureate certificate is a 9-month program that offers mid-career professionals the specific knowledge and skills in leadership, public policy, and program analysis, as well as qualitative and quantitative research methods to succeed in today's public affairs environment.

The curriculum comprises a combination of on-campus and online sessions for the convenience of working professionals both within and outside the Twin Cities metro area. The program includes a 1-day orientation in early August, a 3-day intensive foundations week in late August, and monthly Friday-Saturday meetings from September to May. Classes are in person. Students may choose to be remote on those occasions when they cannot attend in person.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment is required.

Other requirements to be completed before admission:
At least 10 years of post-baccalaureate professional work experience is preferred and highly recommended. Pre-baccalaureate experience may be considered for applicants with a significant gap between completion of high school and the bachelor's degree.

A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, TOEFL scores (when applicable), at least three letters of recommendation, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.

A maximum of 1/3 of the course credits may be S/N, excluding courses only offered on the S/N grade basis.

Required Courses (12 credits)
Take the following courses:
PA 5051 - Leadership Foundations (2.0 cr)
PA 5052 - Public Affairs Leadership (2.0 cr)
PA 5053 - Policy Analysis in Public Affairs (2.0 cr)
PA 5054 - Program Design and Implementation Analysis (2.0 cr)
PA 5055 - Qualitative Research Methods and Analysis (2.0 cr)
PA 5056 - Quantitative Research Methods and Analysis (2.0 cr)
Twin Cities Campus
Public Affairs M.P.A.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue S, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Affairs

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Public Affairs (MPA) degree prepares mid-career professionals for public leadership and policy and program analysis. The curriculum, designed for working professionals, can be completed in one calendar year of full-time enrollment, or two to three years when pursued part time. The program includes a 1-day orientation in early August, a 3-day intensive foundations week in late August, and monthly Friday-Saturday meetings from September to May. Classes are in person. Students may choose to be remote on those occasions when they cannot attend in person. In addition to core coursework, electives are chosen in consultation with the advisor to support each students individual academic and career goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Special Application Requirements:
At least 10 years of post-baccalaureate professional work experience is preferred and highly recommended. Pre-baccalaureate experience may be considered for applicants with a significant gap between completion of high school and the bachelor's degree. A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.
Capstone Project: The capstone project is designed to provide a learning opportunity for students to apply their knowledge through a client-based team project. The workshop includes a written report and oral presentation for the client that summarizes major findings of
the semester-long study.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Coursework offered on both the A-F and S/N grade basis must be taken A-F. Up to 6 of the 14 credits required for self-designed concentration may be taken S/N.

**Required Core Courses (12 credits)**

Take the following courses:

- **PA 5051** - Leadership Foundations (2.0 cr)
- **PA 5052** - Public Affairs Leadership (2.0 cr)
- **PA 5053** - Policy Analysis in Public Affairs (2.0 cr)
- **PA 5054** - Program Design and Implementation Analysis (2.0 cr)
- **PA 5055** - Qualitative Research Methods and Analysis (2.0 cr)
- **PA 5056** - Quantitative Research Methods and Analysis (2.0 cr)

**Capstone Project (4 credits)**

Take the following courses:

- **PA 5080** - Capstone Preparation Workshop (1.0 cr)
- **PA 8081** - Capstone Workshop (3.0 cr)

**Electives (14 credits)**

Select 14 elective credits, in consultation with the advisor, to complete a self-designed concentration. Some common courses are listed below. Other courses may be used with advisor approval.

- **CSPH 5212** - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- **CSPH 5807** - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
- **OLPD 5501** - Principles and Methods of Evaluation (3.0 cr)
- **OLPD 5607** - Organization Development (3.0 cr)
- **PA 5003** - Introduction to Financial Analysis and Management (1.5 cr)
- **PA 5004** - The Politics of Public Affairs (3.0 cr)
- **PA 5081** - Understanding Power and Teamwork in Public Affairs Education (0.5 cr)
- **PA 5101** - Management and Governance of Nonprofit Organizations (3.0 cr)
- **PA 5103** - Leadership and Change (1.5 - 3.0 cr)
- **PA 5104** - Strategic Human Resource Management (3.0 cr)
- **PA 5105** - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
- **PA 5108** - Board leadership development (1.0 cr)
- **PA 5114** - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
- **PA 5135** - Managing Conflict: Negotiation (3.0 cr)
- **PA 5136** - Group Process Facilitation for Organizational and Public/Community Engagement (1.0 cr)
- **PA 5137** - Project Management in the Public Arena (1.5 cr)
- **PA 5144** - Social Entrepreneurship (3.0 cr)
- **PA 5145** - Civic Participation in Public Affairs (3.0 cr)
- **PA 5152** *(Inactive)* (1.5 cr)
- **PA 5161** - Redesigning Human Services (3.0 cr)
- **PA 5162** - Public Service Redesign Workshop (3.0 cr)
- **PA 5190** - Topics in Public and Nonprofit Leadership and Management (1.0 - 3.0 cr)
- **PA 5251** - Strategic Planning and Management (3.0 cr)
- **PA 5290** - Topics in Planning (0.5 - 4.0 cr)
- **PA 5311** - Program Evaluation (3.0 cr)
- **PA 5401** - Poverty, Inequality, and Public Policy (3.0 cr)
- **PA 5405** - Public Policy Implementation (3.0 cr)
- **PA 5421** - Racial Inequality and Public Policy (3.0 cr)
- **PA 5422** - Diversity and Public Policy (3.0 cr)
- **PA 5451** *(Inactive)* (3.0 cr)
- **PA 5490** - Topics in Social Policy (1.0 - 4.0 cr)
- **PA 5501** - Theories and Policies of Development (3.0 cr)
- **PA 5590** - Topics in Economic and Community Development (1.0 - 3.0 cr)
- **PA 5790** - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
- **PA 5801** - Global Public Policy (3.0 cr)
PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
PA 5880 - Exploring Global Cities (1.0 - 3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
PA 5920 - Skills Workshop (0.5 - 4.0 cr)
PA 5926 - Presentation Skills: How to Inspire Your Audience and Change the World (1.0 cr)
PA 5927 - Effective Grantwriting for Nonprofit Organizations (1.5 cr)
PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
PA 5976 - Voter Participation (1.0 cr)
PA 5990 - Topics: Public Affairs - General Topics (0.0 - 3.0 cr)
PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
Twin Cities Campus
Public Affairs Ph.D.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue S, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhphd@umn.edu
Website: http://www.hhh.umn.edu/degrees/phd/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Affairs PhD offers students opportunities for rigorous, advanced study in the areas of public affairs, policy analysis, and planning. The goal of the PhD program is to train researchers who will enter academia or join highly respected public or nonprofit institutions involved in cutting edge research in public affairs, policy, planning, and management. Students pursue one of the following tracks: public policy; urban planning; management and governance; or science, technology, and environmental policy.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Applicants are recommended to have completed undergraduate coursework in microeconomics and mathematics (calculus, statistics, or algebra).

Special Application Requirements:
A complete application will include a University of Minnesota application, a personal statement that includes motivation for pursuing doctoral studies and research interests, a resume or C.V., transcripts, GRE scores, a writing sample, TOEFL scores (if applicable), and at least three letters of recommendation.

For Public Affairs Ph.D. applicants applying for the Fall 2023 cohort, GRE scores are not required. We request that applicants not submit them as they will not be weighed as part of the admissions process.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
42 credits are required in the major.
24 thesis credits are required.
This program may be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.0 is required for students to remain in good standing.
At least 1 semesters must be completed before filing a Degree Program Form.
Practical teaching experience: Doctoral students must complete training in pedagogy and a teaching experience as a course instructor or teaching assistant (TA) with instructional responsibilities. The pedagogical training may take place prior to or concurrent with the teaching experience. For international students, evidence of English-speaking proficiency is required prior to the teaching experience.

Core Coursework (12 credits)
Take the following courses. Take PA 8006 twice for a total of 3 credits.
PA 8003 - Integrative Doctoral Seminar in Public Affairs I (3.0 cr)
PA 8004 - Integrative Doctoral Seminar in Public Affairs II (3.0 cr)
PA 8005 - Doctoral Research Seminar in Public Affairs (3.0 cr)
PA 8006 - Current Research in Public Affairs: Topics, Approaches, and Cultures (1.5 cr)

Research Methods Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor.

Other courses may be selected with approval of the advisor and director of graduate studies.

Qualitative Methods Courses (3 credits)
Select at least 3 credits from the following in consultation with the advisor.
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
SOC 8851 - Advanced Qualitative Research Methods: In-Depth Interviewing (3.0 cr)

Quantitative Methods Courses (3 credits)
Select at least 3 credits from the following in consultation with the advisor.
APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
APEC 8221 - Programming for Econometrics (2.0 cr)
APEC 8222 - Big Data Methods in Economics (2.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
EPSY 8268 - Statistical Analysis of Longitudinal Data (3.0 cr)
GEOG 8299 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
HIST 8970 - Advanced Research in Quantitative History (3.0 cr)
OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
PA 5021 - Microeconomics for Policy Analysis (3.0 cr)
PA 5022 - Applications of Economics for Policy Analysis (1.5 - 3.0 cr)
PA 5031 - Statistics for Public Affairs (4.0 cr)
PA 5032 - Applied Regression (2.0 cr)
PA 5033 - Multivariate Techniques (2.0 cr)
PA 5044 - Applied Regression, Accelerated (2.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PA 8312 - Analysis of Discrimination (4.0 cr)
PA 8331 - Economic Demography (3.0 cr)
PA 8390 - Advanced Topics in Advanced Policy Analysis Methods (1.0 - 3.0 cr)
POL 8160 - Topics in Models and Methods (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8401 - Linear Models (3.0 cr)
PUBH 8472 - Spatial Biostatistics (3.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5201 - Analysis of Categorical Data (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)

Other Methods Courses
Select credits from the following as needed, in consultation with the advisor, to complete the 12-credit Methods requirement:
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
MGMT 8101 - PhD Seminar: Theory Building (2.0 cr)
PSY 8209 - Research Methods in Social Psychology (3.0 cr)
PUBH 6035 - Evaluation II: Applications (3.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.
PA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Public Policy
Coursework (18 credits)
Select credits from 5000 and 8000-level courses in consultation with the advisor and the consent of faculty in the sub-plan area.

Urban Planning
Coursework (18 credits)
Select 18 credits of 5000 and 8000-level courses in consultation with the assigned advisor or co-advisor from the Urban and Regional Planning area.

Management and Governance
Coursework (18 credits)
Select 18 credits of 5000 and 8000-level courses in consultation with the advisor and the consent of faculty in the sub-plan area.

Science, Technology, and Environmental Policy
Coursework (18 credits)
Select 18 credits of 5000 and 8000-level courses in consultation with the advisor and the consent of faculty in the sub-plan area.
Twin Cities Campus
Public Policy M.P.P.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Policy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Policy master's (MPP) curriculum is built upon a core of required theoretical and methodological courses. In remaining courses, students choose either to emphasize more advanced study of analysis or management, or to focus on a particular substantive area of public policy. Structured concentrations include advanced policy analysis methods; economic and community development; gender and public policy; global public policy; human rights; politics and governance; public and nonprofit leadership and management; science, technology, and environmental policy; and social policy.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
Recommended: Strong liberal education background; quantitative and analytical skills; previous college-level coursework in mathematics, statistics, and economics.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

FOR FALL 2023 APPLICANTS ONLY: For M.P.P. applicants applying for the Fall 2023 cohort, GRE scores are not required. We request that applicants not submit them as they will not be weighed as part of the admissions process.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 45 major credits and 0 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

A 200-hour professional internship, in addition to coursework, is required. Internship options, identified through consultation with the Humphrey Schools Career and Professional Development Office, are usually completed during the summer after the second semester of the MPP program.

Coursework offered on both the A-F and S/N grade basis must be taken A-F.

Core Coursework (12 credits)

Take the following courses:
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5011 - Management of Organizations (3.0 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)
- PA 5021 - Microeconomics for Policy Analysis (3.0 cr)

Economics (3 credits)

Select 3 credits from the following in consultation with the advisor:
- APEC 5751 - Global Trade and Policy (3.0 cr)
- FINA 6341 - World Economy (4.0 cr)
- PA 5022 - Applications of Economics for Policy Analysis (1.5 - 3.0 cr)
- PA 5023 - Stratification Economics and Public Policy (2.0 cr)
- PA 5312 - Cost-Benefit Analysis for Program Evaluation (2.0 cr)
- PA 5416 - Economics of U.S. Social Insurance Programs (3.0 cr)
- PA 5431 - Public Policies on Work and Pay (3.0 cr)
- PA 5503 - Economics of Development (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 5722 - Economics of Environmental Policy (3.0 cr)
- PA 5805 - Global Economics (3.0 cr)

Foundational Methods Coursework

Statistics (4 credits)

Select 1 of the following courses in consultation with the advisor:
- PA 5031 - Statistics for Public Affairs (4.0 cr)
- PA 5045 - Statistics for Public Affairs, Accelerated (4.0 cr)

Methods (6 credits)

Select credits from the following in consultation with the advisor:
- PA 5032 - Applied Regression (2.0 cr)
- PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
- PA 5044 - Applied Regression, Accelerated (2.0 cr)

Additional Methods (0-4 credits)

Select courses in consultation with the advisor as needed to complete the 6-credit Methods requirement.
- PA 5033 - Multivariate Techniques (2.0 cr)
- PA 5043 - Economic and Demographic Data Analysis (2.0 cr)
- PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
- PA 5311 - Program Evaluation (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 5528 - Data Management and Visualization with R (1.0 cr)
- PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
- PA 5932 - Working with Data: Finding, Managing, and Using Data (1.5 cr)
- PA 5933 - Survey Methods: Designing Effective Questionnaires (2.0 cr)

Professional Paper (1-3 credits)

Select one of the following in consultation with the advisor. PA 8921, if selected, can be taken for 1-3 credits with approval of the
advisor.
PA 8081 - Capstone Workshop (3.0 cr)
PA 8082 - Professional Paper-Writing Seminar (3.0 cr)
PA 8921 - Master's: Professional Paper (Individual Option) (1.0 - 3.0 cr)

Electives
Select electives in consultation with the advisor to complete the 45-credit minimum.

Concentrations

Advanced Policy Analysis Methods (9 credits)
Select from the following in consultation with the advisor:
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5421 - Racial Inequality and Public Policy (3.0 cr)
PA 5431 - Public Policies on Work and Pay (3.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PA 8386 (Inactive) (2.0 cr)

-OR-

Gender and Public Policy (9 credits)

Required Course (3 Credits)
Take the following course:
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)

Additional Courses (6 credits)
Select courses from the following in consultation with the advisor. If PA 5890 Topics is selected, take Women's Human Rights in Practice. If POL 8360 Topics is selected, take Women, Sex, and Gender and American Politics. If BTHX 5000 is selected, take Gender and the Politics of Health.
BTHX 5000 - Topics in Bioethics (1.0 - 4.0 cr)
BTHX 8510 - Gender and the Politics of Health (3.0 cr)
GWSS 5104 - Transnational Feminist Theory (3.0 cr)
GWSS 5290 - Topics: Biology, Health, and Environmental Studies (3.0 cr)
LAW 6036 - Reproductive Rights (3.0 cr)
LAW 6046 - Human Trafficking (2.0 cr)
LAW 6645 - Gender Theory and the Law (2.0 cr)
LAW 6827 - Women's International Human Rights (2.0 cr)
LAW 6862 - Sexual Orientation, Gender Identity, and Human Rights (2.0 cr)
LAW 6896 - International Human Rights Law (3.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
PA 5426 - Community-Engaged Research and Policy with Marginalized Groups (3.0 cr)
PA 5522 - International Development Policy, Families, and Health (3.0 cr)
PA 5561 - Gender and International Development (3.0 cr)
PA 5622 - GAINS: Gender and Intersectional Network Series, Leadership Workshop I (0.5 - 1.0 cr)
PA 5623 - GAINS: Gender and Intersectional Network Series, Leadership Workshop II (0.5 - 1.0 cr)
PA 5631 - LGBTQ Politics & Policy (1.5 cr)
PA 5683 - Gender, Race and Political Representation (3.0 cr)
PA 5690 - Topics in Women, Gender and Public Policy (0.5 - 3.0 cr)
PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
POL 8360 - Topics in American Politics (3.0 cr)
PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)
SOC 8221 - Sociology of Gender (3.0 cr)

-OR-

Global Public Policy (9 credits)
Select courses from the following in consultation with the advisor.
GLOSS 5403 - Human Rights Advocacy (3.0 cr)
LAW 6071 - International Law (3.0 cr)
LAW 6886 - International Human Rights Law (3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5503 - Economics of Development (3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 5522</td>
<td>International Development Policy, Families, and Health</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5561</td>
<td>Gender and International Development</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5590</td>
<td>Topics in Economic and Community Development</td>
<td>1.0 - 3.0 cr</td>
</tr>
<tr>
<td>PA 5601</td>
<td>Global Survey of Gender and Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5683</td>
<td>Gender, Race and Political Representation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5690</td>
<td>Topics in Women, Gender and Public Policy</td>
<td>0.5 - 3.0 cr</td>
</tr>
<tr>
<td>PA 5801</td>
<td>Global Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5813</td>
<td>US Foreign Policy: Issues and Institutions</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5814</td>
<td>Global Diplomacy in a Time of Change</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5823</td>
<td>Human Rights and Humanitarian Crises: Policy Challenges</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5825</td>
<td>Crisis Management in Foreign Affairs</td>
<td>1.5 cr</td>
</tr>
<tr>
<td>PA 5826</td>
<td>National Security Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5885</td>
<td>Human Rights Policy: Issues and Actors</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5890</td>
<td>Topics in Foreign Policy and International Affairs</td>
<td>0.5 - 5.0 cr</td>
</tr>
<tr>
<td>PA 8151</td>
<td>Organizational Perspectives on Global Development &amp; Humanitarian Assistance</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 8461</td>
<td>Global and U.S. Perspectives on Health and Mortality</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**-OR-**

**Politics and Governance (9 credits)**

Select credits from the following in consultation with the advisor. If PA 5490 Topics is selected, take Political Demography; Crisis Mgmt in Today's Media; or Politics/Policy of Demographic Change.

- PA 5112 (Inactive) (3.0 cr)
- PA 5145 - Civic Participation in Public Affairs (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5261 - Housing Policy (3.0 cr)
- PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
- PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
- PA 5421 - Racial Inequality and Public Policy (3.0 cr)
- PA 5422 - Diversity and Public Policy (3.0 cr)
- PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
- PA 5801 - Global Public Policy (3.0 cr)
- PA 5885 - Human Rights Policy: Issues and Actors (3.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (0.5 - 5.0 cr)
- PA 5962 - State Governing and Legislating: Working the Process (3.0 cr)
- PA 5990 - Topics: Public Affairs - General Topics (0.0 - 3.0 cr)
- PA 8890 - Advanced Topics in Foreign Policy and International Affairs (1.0 - 3.0 cr)
- POL 4315W - State Governments: Laboratories of Democracy [WI] (3.0 cr)

**-OR-**

**Public and Nonprofit Leadership and Management (9 credits)**

Select credits from the following in consultation with the advisor:

- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5011 - Management of Organizations (3.0 cr)
- PA 5051 - Leadership Foundations (2.0 cr)
- PA 5052 - Public Affairs Leadership (2.0 cr)
- PA 5053 - Policy Analysis in Public Affairs (2.0 cr)
- PA 5054 - Program Design and Implementation Analysis (2.0 cr)
- PA 5055 - Qualitative Research Methods and Analysis (2.0 cr)
- PA 5056 - Quantitative Research Methods and Analysis (2.0 cr)
- PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
- PA 5103 - Leadership and Change (1.5 - 3.0 cr)
- PA 5104 - Strategic Human Resource Management (3.0 cr)
- PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
- PA 5106 (Inactive) (1.0 - 3.0 cr)
- PA 5108 - Board leadership development (1.0 cr)
- PA 5113 - State and Local Public Finance (3.0 cr)
- PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
- PA 5116 - Financing Public Leadership and Nonprofit Organizations (1.5 cr)
- PA 5122 - Law and Public Affairs (3.0 cr)
- PA 5123 - Philanthropy in America: History, Practice, and Trends (1.5 - 3.0 cr)
- PA 5135 - Managing Conflict: Negotiation (3.0 cr)
- PA 5136 - Group Process Facilitation for Organizational and Public/Community Engagement (1.0 cr)
- PA 5137 - Project Management in the Public Arena (1.5 cr)
- PA 5144 - Social Entrepreneurship (3.0 cr)
- PA 5145 - Civic Participation in Public Affairs (3.0 cr)
- PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 5161</td>
<td>Redesigning Human Services</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5162</td>
<td>Public Service Redesign Workshop</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5190</td>
<td>Topics in Public and Nonprofit Leadership and Management</td>
<td>1.0 - 3.0 cr</td>
</tr>
<tr>
<td>PA 5251</td>
<td>Strategic Planning and Management</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5311</td>
<td>Program Evaluation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5405</td>
<td>Public Policy Implementation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5622</td>
<td>GAINS: Gender and Intersectional Network Series, Leadership Workshop I</td>
<td>0.5 - 1.0 cr</td>
</tr>
<tr>
<td>PA 5920</td>
<td>Skills Workshop</td>
<td>0.5 - 4.0 cr</td>
</tr>
<tr>
<td>PA 5927</td>
<td>Effective Grantwriting for Nonprofit Organizations</td>
<td>1.5 cr</td>
</tr>
<tr>
<td>PA 8991</td>
<td>Independent Study</td>
<td>0.5 - 4.0 cr</td>
</tr>
</tbody>
</table>

**-OR-**

**Science, Technology, and Environmental Policy (9 credits)**

**Required Course (3 credits)**

Take the following course:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 5711</td>
<td>Science, Technology &amp; Environmental Policy</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Environmental Systems Thinking (3 credits)**

Select 3 credits from the following in consultation with the advisor:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 5715</td>
<td>Deliberating Science, Technology, and Environmental Policy</td>
<td>1.5 cr</td>
</tr>
<tr>
<td>PA 5722</td>
<td>Economics of Environmental Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5741</td>
<td>Risk, Resilience and Decision Making</td>
<td>1.5 cr</td>
</tr>
<tr>
<td>PA 5743</td>
<td>[Inactive]</td>
<td>1.5 cr</td>
</tr>
<tr>
<td>PA 5752</td>
<td>[Inactive]</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5761</td>
<td>Environmental Systems Analysis at the Food-Energy-Water Nexus</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Focus Area (3 credits)**

Select 3 credits from the following in consultation with the advisor:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 5243</td>
<td>Environmental Justice in Urban Planning &amp; Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5721</td>
<td>Energy Systems and Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5723</td>
<td>Water Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5724</td>
<td>Climate Change Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5731</td>
<td>Emerging Sciences and Technologies: Policy, Ethics and Law</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5751</td>
<td>Addressing Climate and Energy Challenges at the Local Scale</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5790</td>
<td>Topics in Science, Technology, and Environmental Policy</td>
<td>1.0 - 3.0 cr</td>
</tr>
</tbody>
</table>

**-OR-**

**Social Policy (9 credits)**

Select 9 credits from the following in consultation with the advisor. If PA 5490 Topics is selected, take Contemporary Social Theory & Public Policy; Contemporary Social Theory and Public Policy; Identity and Public Policy; Gender, Race, and Political Representation; or Economics of Early Childhood Development.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 5261</td>
<td>Housing Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5301</td>
<td>Population Methods &amp; Issues for the United States &amp; Global South</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5401</td>
<td>Poverty, Inequality, and Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5405</td>
<td>Public Policy Implementation</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5413</td>
<td>Early Childhood and Public Policy</td>
<td>1.5 - 3.0 cr</td>
</tr>
<tr>
<td>PA 5414</td>
<td>[Inactive]</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5421</td>
<td>Racial Inequality and Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5422</td>
<td>Diversity and Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5431</td>
<td>Public Policies on Work and Pay</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5451</td>
<td>[Inactive]</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5490</td>
<td>Topics in Social Policy</td>
<td>1.0 - 4.0 cr</td>
</tr>
<tr>
<td>PA 5501</td>
<td>Theories and Policies of Development</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5522</td>
<td>International Development Policy, Families, and Health</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5561</td>
<td>Gender and International Development</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5601</td>
<td>Global Survey of Gender and Public Policy</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PA 5690</td>
<td>Topics in Women, Gender and Public Policy</td>
<td>0.5 - 3.0 cr</td>
</tr>
<tr>
<td>PA 8312</td>
<td>Analysis of Discrimination</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PA 8386</td>
<td>[Inactive]</td>
<td>2.0 cr</td>
</tr>
</tbody>
</table>

**Self-Designed (9 credits)**

Select courses, in consultation with the advisor, to meet academic and professional goals. Other courses can be chosen in consultation with advisor and director of graduate studies approval.

**Joint- or Dual-degree Coursework:**

- MPP/MBA: 12 credits in common allowed
- MPP/JD: 29 credits in common allowed
- MPP/MPH: 26 credits in common allowed for full program, 15 for advanced standing, 11 for direct practice.
Twin Cities Campus
Public Policy Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public policy curriculum is built upon a core of required theoretical and methodological courses. In coursework, students study policy analysis or management or focus on a substantive area of public policy. Substantive areas include advanced policy analysis methods; economic and community development; global public policy; human rights; politics and governance; public and nonprofit leadership and management; public finance and budgeting; science, technology, and environmental policy; social policy; and gender and public policy. Students have multiple opportunities to apply the concepts learned to real-life policy problems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Public Policy director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Specific coursework for the minor is chosen in consultation with the student's minor advisor or the Public Policy director of graduate studies.

A minimum grade of B must be earned for courses taken on the A-F grading basis. Up to 3 credits may be taken S/N.

The minimum cumulative GPA for minor field coursework is 2.8.

Required Coursework (9 to 12 credits)
Masters students select 9 credits, and doctoral students select 12 credits from the following. Approval of the Public Policy director of graduate studies is required. Other courses can be selected with approval of the Public Policy director of graduate studies.

- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5011 - Management of Organizations (3.0 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)
- PA 5021 - Microeconomics for Policy Analysis (3.0 cr)
- PA 5405 - Public Policy Implementation (3.0 cr)
- PA 5413 - Early Childhood and Public Policy (1.5 - 3.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5813 - US Foreign Policy: Issues and Institutions (3.0 cr)
PA 5826 - National Security Policy (3.0 cr)
PA 8302 - Applied Policy Analysis (4.0 cr)
PA 8312 - Analysis of Discrimination (4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Science, Technology, and Environmental Policy M.S.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 36 to 39
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Science, Technology, and Environmental Policy (MSSTEP) at the Humphrey School is one of the few programs in the nation that prepares individuals with backgrounds in natural sciences, physical sciences, or engineering to become leaders and innovators who integrate science with policy and action to solve grand challenges.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
A strong liberal arts education background to include sound quantitative and analytical skills or advanced-level coursework in natural or engineering sciences preferred.

Special Application Requirements:
A complete application will include a University of Minnesota application, a personal statement, a diversity statement, an impact statement, a resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), and at least 3 letters of recommendation.

For M.S.-STEP applicants applying for the Fall 2023 cohort, GRE scores are not required. We request that applicants not submit them as they will not be weighed as part of the admissions process.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 29 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 36 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.

Science, Technology, and Environmental Policy Courses (4.5 credits)
Take the following courses:
- PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
- PA 5715 - Deliberating Science, Technology, and Environmental Policy (1.5 cr)

Sustainability Systems Science Courses (7.5 credits)
Take the following courses:
- PA 5722 - Economics of Environmental Policy (3.0 cr)
- PA 5741 - Risk, Resilience and Decision Making (1.5 cr)

Select 1 of the following courses in consultation with the advisor:
- PA 5752 (Inactive) (3.0 cr)
- PA 5761 - Environmental Systems Analysis at the Food-Energy-Water Nexus (3.0 cr)

Social and Policy Processes Courses (4.5 credits)
Take the following courses:
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)

Foundational Methods
Statistics Course (4 credits)
Select 1 of the following courses in consultation with the advisor:
- PA 5031 - Statistics for Public Affairs (4.0 cr)
- PA 5045 - Statistics for Public Affairs, Accelerated (4.0 cr)

Methods Courses (6 credits)
Select at least one of the following courses in consultation with the advisor. PA 5041 can be taken with PA 5032 or PA 5044 with advisor approval.
- PA 5032 - Applied Regression (2.0 cr)
- PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
- PA 5044 - Applied Regression, Accelerated (2.0 cr)

Select credits in consultation with the advisor to complete the 6-credit methods requirement:
- PA 5033 - Multivariate Techniques (2.0 cr)
- PA 5043 - Economic and Demographic Data Analysis (2.0 cr)
- PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
- PA 5311 - Program Evaluation (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 5928 - Data Management and Visualization with R (1.0 cr)
- PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
- PA 5932 - Working with Data: Finding, Managing, and Using Data (1.5 cr)
- PA 5933 - Survey Methods: Designing Effective Questionnaires (2.0 cr)

Focus Area (3 credits)
Select 1 of the following courses in consultation with the advisor.
- PA 5245 - Environmental Justice in Urban Planning & Public Policy (3.0 cr)
- PA 5721 - Energy Systems and Policy (3.0 cr)
- PA 5723 - Water Policy (3.0 cr)
- PA 5724 - Climate Change Policy (3.0 cr)
- PA 5731 - Emerging Sciences and Technologies: Policy, Ethics and Law (3.0 cr)
- PA 5751 - Addressing Climate and Energy Challenges at the Local Scale (3.0 cr)
Electives
Select electives in consultation with the advisor to meet the minimum credit requirement.

Plan Options

Plan A
Thesis Credits
Take 10 master's thesis credits.
PA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan C
Select 1 of the following in consultation with the advisor. PA 8921, if selected, must be for 3 credits. Students who choose PA 8081: Capstone Workshop will take PA 5080: Capstone Preparation Workshop in the preceding semester.
PA 8081 - Capstone Workshop (3.0 cr)
PA 8082 - Professional Paper-Writing Seminar (3.0 cr)
PA 8921 - Master's: Professional Paper (Individual Option) (1.0 - 3.0 cr)

Joint- or Dual-degree Coursework: MS-STEP/JD (Joint Degree Program in Law, Health, and the Life Sciences) Student may take a total of 24 credits in common among the academic programs.
Science, Technology, and Environmental Policy Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)

Program Type: Graduate minor related to major
Requirements for this program are current for Fall 2022
Length of program in credits (Masters): 9
Length of program in credits (Doctorate): 12
This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in Science, Technology, and Environmental Policy (STEP) provides students with the skills and knowledge to study public issues arising at the intersection of science, technology, environment, and society that shape economic development, environmental sustainability, human health, and wellbeing. Students choose from the following focus areas: energy and environmental policy; water policy; climate change policy; emerging technologies and society; urban infrastructure systems; or urban agriculture and food systems policy.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the STEP director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Up to 3 credits may be taken S/N. All other courses must be completed with grades of B or better.

Minor field coursework is chosen in consultation with the STEP advisor/director of graduate studies.

Required Course (3 credits)
Take the following course on the A-F grading basis:
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)

Environmental Systems Thinking (3 credits)
Select at least 3 credits from the following:
PA 5715 - Deliberating Science, Technology, and Environmental Policy (1.5 cr)
PA 5722 - Economics of Environmental Policy (3.0 cr)
PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
PA 5752 [Inactive](3.0 cr)
or PA 5761 - Environmental Systems Analysis at the Food-Energy-Water Nexus (3.0 cr)
Focus Area (3 credits)
Select at least 3 credits from the following:
PA 5243 - Environmental Justice in Urban Planning & Public Policy (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5723 - Water Policy (3.0 cr)
PA 5724 - Climate Change Policy (3.0 cr)
PA 5731 - Emerging Sciences and Technologies: Policy, Ethics and Law (3.0 cr)
PA 5751 - Addressing Climate and Energy Challenges at the Local Scale (3.0 cr)
PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
**Twin Cities Campus**

**Urban and Regional Planning M.U.R.P.**

**HHH Administration**

**Hubert H. Humphrey School of Public Affairs**

Link to a list of faculty for this program.

**Contact Information:**

Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)

Email: hhhadmit@umn.edu

Website: [http://www.hhh.umn.edu](http://www.hhh.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Urban and Regional Planning

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Urban and Regional Planning masters degree (MURP) is an interdisciplinary program that prepares students to analyze, forecast, design, and implement plans for regions, communities, and neighborhoods. Students develop a comprehensive understanding of the built environment (land use, transportation, housing, regional economies) and the ability to mediate among competing interests. The degree prepares individuals for jobs in public, nonprofit, and private sectors.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:

A strong liberal education background, and sound quantitative and analytical skills are preferred.

Previous coursework in mathematics, statistics, and economics is recommended. Applicants needing to strengthen this part of their skill prior set prior to admission may wish to take introductory microeconomics, college algebra, and/or introductory statistics courses.

**Special Application Requirements:**

A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

FOR FALL 2023 APPLICANTS ONLY: For M.U.R.P. applicants applying for the Fall 2023 cohort, GRE scores are not required. We request that applicants not submit them as they will not be weighed as part of the admissions process.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 38 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 48 major credits and up to null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A 200-hour professional internship, in addition to coursework, is required. Internship options, identified through consultation with the Humphrey Schools Career and Professional Development Office, are usually completed during the summer after the second semester of the MURP program.

Students must demonstrate proficiency in the use and application of GIS or take a graduate-level GIS course as part of the 48-credit requirement.

Required coursework offered on both the A-F and S/N grade basis must be taken A-F.

The program is designed for and primarily serves full-time students.

### Required Core Coursework (24.5 credits)

Take the following courses - PA 8081 can be only taken once for 3 credits:
- **PA 5004** - Introduction to Planning (3.0 cr)
- **PA 5013** - Law and Urban Land Use (1.5 cr)
- **PA 5042** - Urban and Regional Economics (2.0 cr)
- **PA 5043** - Economic and Demographic Data Analysis (2.0 cr)
- **PA 5145** - Civic Participation in Public Affairs (3.0 cr)
- **PA 5205** - Statistics for Planning (4.0 cr)
- **PA 5206** - The City of White Supremacy (3.0 cr)
- **PA 5211** - Land Use Planning (3.0 cr)
- **PA 8081** - Capstone Workshop (3.0 cr)

### Electives

Select from the following, in consultation with the advisor, to meet the minimum number of course credits required for the Plan A (38 credits) or the Plan C (48 credits):
- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- **ARCH 8561** - Sustainable Design Theory and Practice (3.0 cr)
- **ARCH 8567** - Site and Water Issues in Sustainable Design (3.0 cr)
- **ESCI 5102** - Climate Change and Human History (3.0 cr)
- **ESPM 5014** - Tribal and Indigenous Natural Resource Management (3.0 cr)
- **ESPM 5061** - Water Quality and Natural Resources (3.0 cr)
- **ESPM 5108** - Ecology of Managed Systems (4.0 cr)
- **ESPM 5202** - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- **ESPM 5245** - Sustainable Land Use Planning and Policy (3.0 cr)
- **ESPM 5251** - Natural Resources in Sustainable International Development (3.0 cr)
- **ESPM 5295** - GIS in Environmental Science and Management (4.0 cr)
- **ESPM 5603** - Environmental Life Cycle Analysis (3.0 cr)
- **ESPM 5604** - Environmental Management Systems and Strategy (3.0 cr)
- **FNRM 5313** - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- **FNRM 5294** - Landscape Ecology and Management (3.0 cr)
- **FNRM 5501** - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
- **GCC 5008** - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
- **GCC 5011** - Pathways to Renewable Energy [TS] (3.0 cr)
- **GCC 5013** - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)
- **GCC 5017** - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
GCC 5027 - Power Systems Journey: Making the Invisible Visible and Actionable [TS] (3.0 cr)
GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
GCC 5032 - Ecosystems Health: Leadership at the intersection of humans, animals and the environment [ENV] (3.0 cr)
GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
HSCT 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
LA 5003 - Climate Change Adaptation (3.0 cr)
LA 5004 - Regional Environmental Landscape Planning (4.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
LAW 5062 - Energy Law (3.0 cr)
LAW 6215 - Environmental Law (3.0 cr)
LAW 6234 - Public Lands and Natural Resources (3.0 cr)
PA 5113 - State and Local Public Finance (3.0 cr)
PA 5212 - Managing Urban Growth and Change (3.0 cr)
PA 5213 - Introduction to Site Planning (3.0 cr)
PA 5221 - Private Sector Development (3.0 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5261 - Housing Policy (3.0 cr)
PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5880 - Exploring Global Cities (1.0 - 3.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6154 - Climate Change and Global Health (3.0 cr)

Plan A Thesis Credits
Plan A students take 10 master's thesis credits.
PA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Concentrations
All students select 1 of the following concentrations in consultation with the advisor. The concentration must comprise 6 course credits for Plan A students, or 12 course credits for Plan C students.

Environmental Planning (6 to 12 credits)
Required Course (3 credits)
Take the following course:
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)

Additional Coursework (3 to 9 credits)
Plan A students select 3 credits, and Plan C students select 9 credits from the following in consultation with the advisor. Students may select other courses, subject to advisor approval.
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
ARCH 8567 - Site and Water Issues in Sustainable Design (3.0 cr)
ESCI 5102 - Climate Change and Human History (3.0 cr)
ESPM 5014 - Tribal and Indigenous Natural Resource Management (3.0 cr)
ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
ESPM 5108 - Ecology of Managed Systems (4.0 cr)
ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FNRM 5204 - Landscape Ecology and Management (3.0 cr)
FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
GCC 5011 - Pathways to Renewable Energy [TS] (3.0 cr)
GCC 5013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)
GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
GCC 5027 - Power Systems Journey: Making the Invisible Visible and Actionable [TS] (3.0 cr)
GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
GCC 5032 - Ecosystems Health: Leadership at the intersection of humans, animals and the environment [ENV] (3.0 cr)
GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
HSCT 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
LA 5003 - Climate Change Adaptation (3.0 cr)
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>LA 5004</td>
<td>Regional Environmental Landscape Planning</td>
<td>4.0 cr</td>
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<tr>
<td>LA 5204</td>
<td>Metropolitan Landscape Ecology</td>
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<td>Energy Law</td>
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<td>LAW 6234</td>
<td>Public Lands and Natural Resources</td>
<td>3.0 cr</td>
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<tr>
<td>PA 5243</td>
<td>Environmental Justice in Urban Planning &amp; Public Policy</td>
<td>3.0 cr</td>
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<tr>
<td>PA 5711</td>
<td>Science, Technology &amp; Environmental Policy</td>
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<tr>
<td>PA 5715</td>
<td>Deliberating Science, Technology, and Environmental Policy</td>
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<td>PA 5721</td>
<td>Energy Systems and Policy</td>
<td>3.0 cr</td>
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<td>PA 5722</td>
<td>Economics of Environmental Policy</td>
<td>3.0 cr</td>
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<td>PA 5724</td>
<td>Climate Change Policy</td>
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<td>3.0 cr</td>
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OR

Housing and Community Development (6 to 12 credits)

**Required Courses (6 credits)**

Take the following courses:

- PA 5261 - Housing Policy (3.0 cr)
- PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)

**Additional Coursework (0 to 6 credits)**

Plan C students select 6 credits from the following, in consultation with the advisor. Students may select other courses, subject to advisor approval.

- LAW 6031 - Smart Growth (2.0 cr)
- LAW 6213 - Real Estate Transactions (3.0 cr)
- PA 5212 - Managing Urban Growth and Change (3.0 cr)
- PA 5221 - Private Sector Development (3.0 cr)
- PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
- PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
- PA 5421 - Racial Inequality and Public Policy (3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- PA 5512 - Workforce and Economic Development (3.0 cr)

OR

Land Use and Urban Design (6 to 12 credits)

**Required Course (3 credits)**

Take the following course:

- PA 5213 - Introduction to Site Planning (3.0 cr)

**Additional Coursework (3 to 9 credits)**

Plan A students select 3 credits, and Plan C students select 9 credits from the following in consultation with the advisor. Students may select other courses, subject to advisor approval.

- ARCH 5391 - Design and Representation with BIM (3.0 cr)
- ARCH 5671 - Historic Preservation (3.0 cr)
- ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
- ARCH 5721 - Case Studies in Urban Design (3.0 cr)
- ARCH 5756 - Public Interest Design: Principles and Practices (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
- FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
- GIS 5571 - ArcGIS I (3.0 cr)
- GIS 5572 - ArcGIS II (3.0 cr)
- GIS 5574 - Web GIS and Services (3.0 cr)
- LA 5004 - Regional Environmental Landscape Planning (4.0 cr)
- LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
- LAW 6031 - Smart Growth (2.0 cr)
- LAW 6201 - Land Use Planning (3.0 cr)
- PA 5209 - Urban Planning and Health Equity (3.0 cr)
- PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
- PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)
- PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
- PA 5290 - Topics in Planning (0.5 - 4.0 cr)
- PA 5751 - Addressing Climate and Energy Challenges at the Local Scale (3.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)

-OR-

Transportation Planning (6 to 12 credits)
Plan A students select 6 credits, and Plan C students select 12 credits from the following in consultation with the advisor. Students may select other courses, subject to advisor approval.

GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
PA 5113 - State and Local Public Finance (3.0 cr)
PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5232 - Transportation Policy, Planning, and Deployment (3.0 cr)
PA 5233 - Sustainable Transportation (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5290 - Topics in Planning (0.5 - 4.0 cr)
PA 5880 - Exploring Global Cities (1.0 - 3.0 cr)

-OR-

Self-Designed (6 to 12 credits)
Select courses, in consultation with the advisor, to meet academic and professional goals. Other courses can be chosen in consultation with advisor and director of graduate studies approval.

Joint- or Dual-degree Coursework:
MURP/JD: 29 credits in common allowed. MURP/MLA: 37 credits in common allowed. MURP/MPH: 26 credits in common allowed. MURP/MSCE: 18 credits in common allowed. MURP/MSW: 21 credits in common allowed for the full program; 15 for the advanced standing program; and 11 for MSW Direct Practice.
Twin Cities Campus
Urban and Regional Planning Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Planners bring together knowledge and expertise from many diverse disciplines to shape neighborhoods, cities, and regions. The Urban and Regional Planning minor helps students to think across those fields of expertise and act upon links among environmental systems, infrastructure development, and housing and community development. The minor teaches technical and analytical skills needed to think strategically about developing and implementing plans at the neighborhood, city, and regional level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Urban and Regional Planning director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

No more than 3 credits may be taken S/N. All other courses must be completed with grades of B or higher.

The minimum cumulative GPA for minor field coursework is 3.00.

Core Course (3 credits)
Take the following course:
PA 5004 - Introduction to Planning (3.0 cr)

Additional Course (3 credits)
Select a course from the following in consultation with the Urban and Regional Planning director of graduate studies:
PA 5211 - Land Use Planning (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5261 - Housing Policy (3.0 cr)
PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)

Electives (3 to 6 credits)
Master's students select 3 credits, and doctoral students select 6 credits from the following in consultation with the Urban and Regional Planning director of graduate studies:

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Information current as of November 07, 2022
Planning director of graduate studies. Other PA courses may be selected with approval of the Urban and Regional Planning director of graduate studies.

PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
PA 5021 - Microeconomics for Policy Analysis (3.0 cr)
PA 5113 - State and Local Public Finance (3.0 cr)
PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
PA 5206 - The City of White Supremacy (3.0 cr)
PA 5209 - Urban Planning and Health Equity (3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5212 - Managing Urban Growth and Change (3.0 cr)
PA 5213 - Introduction to Site Planning (3.0 cr)
PA 5221 - Private Sector Development (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5232 - Transportation Policy, Planning, and Deployment (3.0 cr)
PA 5233 - Sustainable Transportation (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5243 - Environmental Justice in Urban Planning & Public Policy (3.0 cr)
PA 5251 - Strategic Planning and Management (3.0 cr)
PA 5261 - Housing Policy (3.0 cr)
PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
PA 5290 - Topics in Planning (0.5 - 4.0 cr)
PA 5511 - Community Economic Development (3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)
PA 5751 - Addressing Climate and Energy Challenges at the Local Scale (3.0 cr)
PA 5880 - Exploring Global Cities (1.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Juridical Science S.J.D.
Law School

Link to a list of faculty for this program.

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Juridical Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The SJD program at the University of Minnesota Law School is intended for those who wish to carry on advanced legal study and original research under faculty supervision. SJD students must present research which makes a significant, original contribution of long-term value to legal scholarship. The dissertation must be of publishable quality and provide lawyers, scholars, or governmental officials with a useful understanding, not previously available, of a particular area of the law.

Accreditation
This program is accredited by acquiescence of the American Bar Association.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have completed the first degree in law AND must have completed (or are in the process of completing) a US LLM degree at the University of Minnesota or other ABA accredited institution.

Special Application Requirements:
1) Submission of a preliminary dissertation proposal demonstrating that the dissertation will constitute an original and substantial contribution, of publishable quality, to legal scholarship, in a research field in which the Law School has experienced faculty available for advising, and 2) Submission of an extensive, high quality writing sample written in English to demonstrate the ability to engage in advanced research and writing.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 80
- IELTS
  - Total Score: 65

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.
At least 2 semesters must be completed before filing a Degree Program Form.

**Coursework Requirements**

**Legal Research**
- Take one of the following courses, or another research course approved by your faculty adviser or the director of graduate studies.
  - LAW 6851 - Practice-Ready Legal Research (2.0 cr)
  - or LAW 6867 - Practice-Ready International Legal Research (2.0 cr)

**Elective Courses**
- The remaining 22 credits are determined through consultation with your faculty advisor or the director of graduate studies.

**Thesis Credit Requirement**
- 24 Thesis Credits
Twin Cities Campus

Law Minor

Law School

Link to a list of faculty for this program.

Contact Information:
Law School, Walter F. Mondale Hall, 229 19th Avenue South, Minneapolis, MN 55406 (612-625-1000; fax: 612-625-2011)
Email: lawcurr@umn.edu
Website: https://law.umn.edu/academics/degree-programs/graduate-students

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The law minor is available to both master's and doctoral students and is individually tailored to their academic interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Law director of graduate studies regarding feasibility and requirements. Requirements may include pre-approval to register for specific courses. Contact the Law Schools Curriculum Office at lawcurr@umn.edu for more information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses (6 credits)
Select at least 6 credits from the following, in consultation with the law minor's director of graduate studies.
LAW 5xxx
LAW 6xxx

Doctoral
Required Courses (12 credits)
Select at least 12 credits from the following, in consultation with the law minor's director of graduate studies.
LAW 5xxx
LAW 6xxx
Master of Science Patent Law

Law School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota Law School
Master of Science in Patent Law Program
411 Walter F. Mondale Hall
229 19th Avenue South
Minneapolis, MN 55455
Email: patlaw@umn.edu
Website: https://www.law.umn.edu/academics/degree-programs/mspl-program

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science Patent Law

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Patent Law is a professional master's degree for scientists and engineers interested in pursuing a career in the growing field of patent law. The program requirements may be completed in one year of full-time study or in two years (with an optional third year) on a part-time basis. This program is offered through the University of Minnesota Law School. Students in this program will learn practical patent drafting, patent research, portfolio management, and innovation skills. Many courses in this program will be taken jointly with JD students.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants with a degree in Science or Engineering are preferred.

Other requirements to be completed before admission:
GRE and LSAT scores are accepted but not required.

Special Application Requirements:
Personal statement, resume, letters of recommendation, interview, patent bar eligibility assessment.

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.
Capstone Project: Patent Law CAPSTONE: Innovation (3 credits): Students select a technology of interest with the cooperation of their adviser. Using their knowledge of innovation, patent law, patent prosecution, patent research and strategy they will identify, articulate and present opportunities for innovation in their chosen technology.

This program may not be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Patent Law: Core Curriculum**

Take 20 credits of core coursework and the 3-credit capstone course for a total of 23 credits.

- LAW 5001 - Introduction to the American Legal System (2.0 cr)
- LAW 5002 - MSPL Legal Research and Writing (1.0 cr)
- LAW 5025 - Patent Law In Practice (1.0 cr)
- LAW 5026 - Intellectual Property In Practice (1.0 cr)
- LAW 5075 - Ethics for Patent Agents (1.0 cr)
- LAW 5244 - Patents (3.0 cr)
- LAW 5231 - Patent Prosecution Practice I (2.0 cr)
- LAW 5232 - Patent Prosecution Practice II (3.0 cr)
- LAW 5243 - Patent Research and Writing (2.0 cr)
- LAW 5250 - Patent Portfolio Management (2.0 cr)
- LAW 5707 - Intellectual Property Transactions (2.0 cr)

**Capstone Course**

Students are required to take the 3 credit capstone course.

- LAW 5290 - Patent Law Capstone: Innovation (3.0 cr)

**Electives (7 credits)**

Take at least 7 elective credits in consultation with the program director. Coursework can be from the following list or selected with approval from the program director.

- LAW 5062 - Energy Law (3.0 cr)
- LAW 5076 - Essentials of Business for Lawyers (3.0 cr)
- LAW 5103 - Data Privacy Law (3.0 cr)
- LAW 5127 - Patent Drafting and Oral Advocacy Competition Team (1.0 cr)
- LAW 5608 - Trademarks (3.0 cr)
- LAW 5613 - Copyright (3.0 cr)
- LAW 5629 - Patent Field Placement (1.0 - 3.0 cr)
- LAW 5836 - Trade Secret Law (2.0 cr)
- LAW 5908 - Independent Research and Writing (1.0 - 2.0 cr)
- LAW 5909 - Independent Field Placement (1.0 - 3.0 cr)
- LAW 6133 - Data Compliance Practicum (1.0 cr)
- LAW 6225 - Winning Patent Litigation (2.0 cr)
- LAW 6241 - Patent Remedies (1.0 cr)
- LAW 6402 - Food and Drug Law (3.0 cr)
- LAW 6605 - Health Law (3.0 cr)
- LAW 6609 - International Intellectual Property (3.0 cr)
- LAW 6610 - Unfair Competition (2.0 cr)
- LAW 6622 - International Business Operation and Negotiation (3.0 cr)
- LAW 6709 - Agriculture and the Environment (2.0 cr)
- LAW 6832 - Cybercrime and Cybersecurity (2.0 cr)
- LAW 6853 - Law, Biomedicine and Bioethics (3.0 cr)
- LAW 6876 - Digital Evidence (2.0 cr)
- LAW 6949 - Biotechnology & Patent Law (2.0 cr)
Twin Cities Campus

Integrative Biology and Physiology M.S.

Integrative Biology and Physiology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5644)
Email: ibpdept@umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Integrative Biology and Physiology graduate program does not routinely accept applications directly to the MS; rather, the MS Plan A and Plan B are an additional or alternative credential for students admitted to the Integrative Biology and Physiology PhD program.

The Twin Cities graduate program has a cardiovascular emphasis, although other areas of specialization are represented.

The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year degree in a basic science discipline is required for admission.

Other requirements to be completed before admission:
Admission to the IBP Masters program requires a four-year degree in a basic science discipline.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Listening Score: 25
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Internet Based - Speaking Score: 25
- IELTS
  - Total Score: 7
  - Listening Score: 7
  - Reading Score: 7
  - Writing Score: 7
  - Speaking Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project, completed under the direction of an IBP faculty member, focuses on an aspect of Physiology.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Coursework (20 credits)
Plan A and Plan B students take section 002 of PHSL 5061. Take PHSL 8294 at least twice for 2 credits (total 4 credits) PHSL 8242 is offered every other summer. Take PHSL 5096 (seminar) 4 times.

- ANSC 5702 - Cell Physiology (4.0 cr)
- PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
- PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
- PHSL 8232 - Critical Reading of Journal Articles in Physiology (2.0 cr)
- PHSL 8242 - Professional Skills Development for Biomedical Scientists (2.0 cr)
- PHSL 8294 - Research in Physiology (1.0 - 18.0 cr)

Plan Options

Plan A Thesis Credits
Take at least 10 master's thesis credits.

PHSL 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Coursework

Required Physiology Coursework (6 credits)
Plan B students need to take two of the four courses during Spring semester of year one. If PHSL 5197 is take, choose 3 credit option.

- PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
- PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
- PHSL 5221 - Systems and Computational Physiology (3.0 cr)
- PHSL 5444 - Muscle (3.0 cr)

Biostatistics Requirement (4 credits)
Plan B students select 1 course from the following, in consultation with the director of graduate studies.

- PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6451 - Biostatistics II (4.0 cr)
- or STAT 5021 - Statistical Analysis (4.0 cr)
Twin Cities Campus
Integrative Biology and Physiology Minor
Integrative Biology and Physiology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5902; fax: 612-301-1543)
Email: ibpdept@umn.edu
Website: http://physiology.med.umn.edu/graduate-program/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a "hybrid" field in which expertise from many other disciplines is ordinarily required and combined. The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals.

The graduate program in the Twin Cities has a cardiovascular emphasis, although many other areas of specialization are represented.

The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Integrative Biology and Physiology director of graduate studies regarding feasibility and requirements.

For the minor, a background in mathematics, physics, chemistry, and biology acceptable to the graduate faculty is required.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students must complete the minor with a 3.00 GPA. All coursework must be taken A-F.

Coursework
Select coursework in consultation with the IBP director of graduate studies. Masters students must complete at least 9 credits; doctoral students complete at least 12 credits.
PHSL 4xxx
PHSL 5xxx
PHSL 8xxx
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Integrative Biology and Physiology Ph.D.
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street SE, Minneapolis, MN 55455 (612-625-5902; fax: 612-301-1543)
Email: ibpdept@umn.edu
Website: http://ibpgradprog

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 56
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a “hybrid” field in which expertise from many other disciplines is ordinarily required and combined.

The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals. PhD students take a core concentration that provides a broad background in the physiology of membranes, cells, transport, and organ systems. Individualized programs are structured to build on the student's strengths and to fill in gaps that would otherwise be an impediment to specific problem solving. Teaching experience is also available to all students.

The graduate program in the Twin Cities has cardiovascular, hypertension and metabolism emphases, although many other areas of specialization are represented.

Students can enter the PhD program from the Twin Cities or Duluth campus. Highly qualified individuals with solid quantitative backgrounds are encouraged to apply. In the Twin Cities, prospective students also include people with previous medical training who are already at the University of Minnesota or are considering the University of Minnesota Medical School for residency or fellowship training.

Entering PhD students are expected to take a series of laboratory rotations to familiarize themselves with active areas of research within the degree program. The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
An undergraduate degree with at least one year (three quarters or two semesters) of calculus, one year of physics, one year of biology, and two years of chemistry is required. For the minor, a background in mathematics, physics, chemistry and biology acceptable to the graduate faculty is required.

Special Application Requirements:
There are no minimum GPA or GRE score requirements. All applicants need three letters of recommendation. Admission to the program begins in the Fall semester.

International applicants must submit score(s) from one of the following tests:

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 625
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
32 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

During the first year, students rotate through three to four laboratories, attend weekly seminars, choose an advisor, and begin a research project.

All coursework must be taken A-F and with an earned grade of B or higher unless offered S/N only.

Required Coursework (19 credits)
Take the following courses in consultation with the advisor. 2 credits of PHSL 5701; and 2 credits of PHSL 8294, on an S/N grade basis, at least twice for 4 credits. Take PHSL 5061, section 002.

ANSC 5702 - Cell Physiology (4.0 cr)
BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
PHSL 5701 - Physiology Laboratory (1.0 - 2.0 cr)
PHSL 8232 - Critical Reading of Journal Articles in Physiology (2.0 cr)
PHSL 8242 - Professional Skills Development for Biomedical Scientists (2.0 cr)
PHSL 8294 - Research in Physiology (1.0 - 18.0 cr)

PhD Seminar (4 credits)
Take PHSL 5096 at least 4 times for a total of 4 credits.
PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)

Required Physiology Coursework (6 credits)
Students need take two of the four courses during Spring semester of year one. If PHSL 5197 is taken, choose 3 credits option.
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
  •PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
  •PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
  •PHSL 5221 - Systems and Computational Physiology (3.0 cr)
  •PHSL 5444 - Muscle (3.0 cr)

Biostatistics Coursework (3 credits)
Select at least 3 credits from the following, in consultation with the advisor.
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Thesis Credits (24 credits)
Take 24 credits of doctoral thesis credits.
PHSL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Medical Physics M.S.
Radiation Oncology Administration, Radiology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Radiation Oncology
420 Delaware Street SE
MMC 494
Minneapolis, MN 55455
phone: 612-626-6505; fax: 612-626-7060)
Email: alaei001@umn.edu
Website: https://www.radiationoncology.umn.edu/medical-physics-graduate-program

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• no
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program is made up of faculty members with primary appointments in the departments of radiation oncology and radiology. Affiliate faculty have primary appointments in other departments. The goal of the program is to prepare students (1) for further education, teaching, and research in medical physics, (2) to qualify to enter a medical physics residency program in radiation therapy or imaging, and (3) to provide the mathematical and technical knowledge needed to succeed in the field of medical physics.

Accreditation
This program is accredited by Commission on Accreditation of Medical Physics Education Programs, Inc. (CAMPEP)

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A degree in physics or engineering or other physical science. Equivalent of an undergraduate physics minor—at least 2 semesters of calculus based physics and at least 3 upper level physics courses.

Other requirements to be completed before admission:
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation and the general GRE test are required. If the GRE was taken more than two years prior to application, the applicant may need to retake the examination. We have no absolute GRE cutoff score, but the score is taken into consideration along with other factors in the evaluation of each application. Applicants with a graduate degree from a US institution are waived the GRE requirement. Applicants are considered for admission in fall semester only.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• IELTS
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Required Courses (25 Credits)

Take all of the following courses. Take MPHY 5138 for 1 credit.

MPHY 5138 - Research Seminar (1.0 - 5.0 cr)
MPHY 5160 - Advanced Radiation Physics and Dosimetry (3.0 cr)
MPHY 5170 - Radiation Therapy Physics I (3.0 cr)
MPHY 5171 - Medical and Health Physics of Imaging I (3.0 cr)
MPHY 5172 - Radiation Biology (3.0 cr)
MPHY 5173 - Radiation Therapy Physics II (3.0 cr)
MPHY 5174 - Medical and Health Physics of Imaging II (3.0 cr)
PHAR 5201 - Applied Medical Terminology (2.0 cr)
PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)

Electives (5 Credits)

Take at least 5 elective credits, in consultation with the advisor, to complete the 30-credit requirement. MPHY 5139, once available, may also be used as an elective.

MPHY 5139 - Seminar and Journal Club (1.0 cr)
MPHY 5177 - Radiation Therapy Physics Lab: Radiation Physics Basics (3.0 cr)
MPHY 5178 - Physical Principles of Magnetic Resonance Imaging (3.0 cr)
MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
MPHY 8148 - Advanced Digital Imaging Science (3.0 cr)
MPHY 8149 - Advanced Topics in Radiation Therapy Physics (2.0 cr)
Twin Cities Campus
Medical Physics Ph.D.
Radiation Oncology Administration, Radiology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Radiation Oncology
420 Delaware Street SE
MMC 494
Minneapolis, MN 55455
Email: alaei001@umn.edu
Website: https://www.radiationoncology.umn.edu/medical-physics-graduate-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 49
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program is made up of faculty members with primary appointments in the departments of radiation oncology and radiology. Affiliate faculty have primary appointments in other departments. The goal of the program is to prepare students (1) for further education, teaching, and research in medical physics, (2) to qualify to enter a medical physics residency program in radiation therapy or imaging, and (3) to provide the mathematical and technical knowledge needed to succeed in the field of medical physics.

Accreditation
This program is accredited by Commission on Accreditation of Medical Physics Education Programs, Inc. (CAMPEP)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A degree in physics or engineering or other physical science. Equivalent of an undergraduate physics minor-at least 2 semesters of calculus based physics and at least 3 upper level physics courses.

Special Application Requirements:
Three letters of recommendation and the general GRE test are required. If the GRE was taken more than two years prior to application, the applicant may need to retake the examination. There are no absolute GRE cutoff score, but the score is taken into consideration along with other factors in the evaluation of each application. Applicants with a graduate degree from a US institution are waived the GRE requirement. Applicants are considered for admission in fall semester only.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
25 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Courses (25 Credits)
Take the following required courses. Take MPHY 5138 for at least 1 credit.

- MPHY 5138 - Research Seminar (1.0 - 5.0 cr)
- MPHY 5160 - Advanced Radiation Physics and Dosimetry (3.0 cr)
- MPHY 5170 - Radiation Therapy Physics I (3.0 cr)
- MPHY 5171 - Medical and Health Physics of Imaging I (3.0 cr)
- MPHY 5172 - Radiation Biology (3.0 cr)
- MPHY 5173 - Radiation Therapy Physics II (3.0 cr)
- MPHY 5174 - Medical and Health Physics of Imaging II (3.0 cr)
- PHAR 5201 - Applied Medical Terminology (2.0 cr)
- PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.

- MPHY 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Microbiology, Immunology, and Cancer Biology M.S.
Medical School - Adm
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Microbiology and Immunology, 689 23rd Avenue SE, Minneapolis, MN 55455, 612-624-5947
Email: micab@umn.edu
Website: http://micab.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2022
• Length of program in credits: 34
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly into the master's program; it is available only by special arrangement with the program.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree (BS preferred).

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 85

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 24 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.
During the first year of study, students will identify an advisor through completing laboratory rotations, select a focus area, and initiate thesis research. Students also must complete an ethics seminar and responsible conduct of research course their first year in the program.

All coursework must be taken for an A-F grade and completed with a minimum grade of C, unless the course is only offered for an S/N grade.

No more than one 4xxx-level elective course can be applied to this degree.

**Core Coursework (4 credits)**
Take one of the following 4-credit core courses in consultation with the advisor. Although only one of the 3 courses is required, taking all 3 is strongly encouraged. If students take more than one of these courses, the additional course(s) will count towards the elective coursework requirement.

- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)

**Required Coursework (4 credits)**
Take both of the following courses. Take MICA 8094 twice (fall and spring semester of the first year) for 2 credits.

- MICA 8012 - Writing and Reviewing a Research Proposal (2.0 cr)
- MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)

**Practicum and Seminar Coursework**
Take all of the following courses. Take MICA 8910 4 times; and MICA 8920 4 times.

- MICA 5000 - Practicum: Teaching (0.0 cr)
- MICA 8910 - Seminar: Faculty Research Topics (0.0 cr)
- MICA 8920 - Seminar: Student Research Topics (0.0 cr)

**Elective Coursework**
Select electives, in consultation with the advisor, to complete the 24 course credits required. Use of 4xxx- and 5xxx-level courses is restricted to either two 5-level courses or one 4- and one 5-level course.

- BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
- BIOC 5351 - Protein Engineering (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5960 - Biophysical Spectroscopy (2.0 cr)
- BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
- BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
- BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- BIOL 8100 - Improvisation for Scientists (1.0 cr)
- BTHX 5610 - Research & Publication Seminar (1.0 cr)
- CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
- CHEM 8995 - Special Topics (1.0 - 4.0 cr)
- CMB 5571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
- CMB 8571 - Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)
- CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
- ESCI 4801 - Geomicrobiology (3.0 cr)
- ESCI 8801 - Geomicrobiology (3.0 cr)
- GCD 5005 - Computer Programming for Biology (3.0 cr)
- GCD 6103 - Human Histology (3.0 - 8.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8141 - Computational Genomics (3.0 cr)
- GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
- GCD 8401 - Ethics, Public Policy & Careers in Molecular Cell Biology (1.0 cr)
- GCD 8920 - Special Topics (1.0 - 4.0 cr)
- GEOG 8260 - Seminar: Physical Geography (2.0 cr)
- GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 8440 - Foundations of Translational Bioinformatics Lab (2.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
MEDC 8461 - Design of Cancer Therapeutics (3.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MICA 8010 - Microbial Pathogenesis (3.0 cr)
MICA 8011 - Current Topics in Immunology (3.0 cr)
MICA 8013 - Translational Cancer Research (2.0 cr)
MICA 8014 - Small RNA Biology (2.0 cr)
MICE 5035 - Personal Microbiome Analysis (3.0 cr)
OBIO 5010 - Molecular Virology (1.0 cr)
OBIO 5020 - Virus Pathogenesis and Host Interactions (1.0 cr)
OBIO 8050 - Evolution of Emerging Viruses (2.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHSL 8242 - Professional Skills Development for Biomedical Scientists (2.0 cr)
PMB 5111 - Microbial Physiology and Diversity (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6365 - Global Challenges in Infectious Disease Epidemiology (2.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)

**Thesis Credits**
Take at least 10 master's thesis credits.
MICA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Microbiology, Immunology, and Cancer Biology Minor

Medical School - Adm

Link to a list of faculty for this program.

Contact Information:
Department of Microbiology and Immunology
689 23rd Avenue SE, Minneapolis, MN 55455
612-624-5947
Email: micab@umn.edu
Website: http://micab.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- No

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Required courses include calculus, general chemistry, organic chemistry, and physics. A minimum of two upper-level biology courses, which may include biochemistry, genetics, cell biology, molecular biology, microbiology, or immunology, etc. are also required.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the MICaB director of graduate studies regarding feasibility and requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 96

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All courses must be taken A-F unless only offered S/N. A minimum grade of C is required for A-F coursework. The minimum cumulative GPA for the minor is 3.0.

Required Coursework (8 credits)
Masters and doctoral students must take 2 of the following courses, selected in consultation with the MICaB director of graduate studies, for a total of 8 credits:

- **MICA 8002** - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- **MICA 8003** - Immunity and Immunopathology (4.0 cr)
- **MICA 8004** - Cellular and Cancer Biology (4.0 cr)

### Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

#### Masters

**Master's Requirements**

See Program Requirements, above.

#### Doctoral

**Doctoral Requirements (4 credits)**

Select at least 4 credits of MICaB coursework, in consultation with the MICaB director of graduate studies, to complete the 12-credit minimum.

- **MICA 8005** - Topics in Microbiology, Immunology, and Cancer Biology (1.0 - 4.0 cr)
- **MICA 8006** - Protein Sequence Analysis (3.0 cr)
- **MICA 8007** - Cell Biology and Biochemistry of the Extracellular Matrix (3.0 cr)
- **MICA 8009** - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
- **MICA 8010** - Microbial Pathogenesis (3.0 cr)
- **MICA 8011** - Current Topics in Immunology (3.0 cr)
- **MICA 8013** - Translational Cancer Research (2.0 cr)
- **MICA 8014** - Small RNA Biology (2.0 cr)
- **MICA 8320** - Readings in Neurobiology (1.0 - 4.0 cr)
Twin Cities Campus
Microbiology, Immunology, and Cancer Biology Ph.D.
Medical School - Adm

Medical School

Link to a list of faculty for this program.

Contact Information:
Microbiology, Immunology and Cancer Biology PhD Program
689 23rd Avenue SE, Room 1-109 MRF
Minneapolis, MN 55455
612-624-5947
Email: micab@umn.edu
Website: http://micab.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree (BS preferred).

Other requirements to be completed before admission:
Required courses include calculus, general chemistry, organic chemistry, and physics. A minimum of two upper-level biology courses, which may include biochemistry, genetics, cell biology, molecular biology, microbiology, or immunology, etc., are also required.

Research experience is required. Relevant undergraduate experience includes honors thesis work, paid or volunteer work in a research laboratory and summer internships. It does not include laboratory courses that accompany science courses such as biology. Postbaccalaureate research experience is preferred but not required.

Special Application Requirements:
The program evaluates applications based on four equally weighted criteria: academics, letters (3) of recommendation, a personal statement, and research experience. We do not accept or require GRE scores. Letters of recommendation from research advisers or mentors are preferred as these individuals can comment knowledgeably on the student's potential in biomedical research. Applicants' personal statements should describe their research in general and their specific contribution to it, their rationale for seeking a doctoral degree, and any information they wish to share regarding their backgrounds and interest in the MICaB Program. Finally, applicants should provide specific details of their research experiences (project titles, mentors, dates, locations, etc.), along with a list of relevant abstracts, publications, etc.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 85

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of November 07, 2022
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

During the first year of study, students will identify an advisor through completing laboratory rotations, select a focus area, and initiate thesis research. Students also must complete an ethics seminar and responsible conduct of research course their first year in the program.

All coursework must be taken for an A-F grade and completed with a minimum grade of C, unless the course is only offered for an S/N grade.

No more than one 4xxx-level elective course can be applied to this degree.

Core Coursework (4 credits)
Take one of the following 4-credit core courses in consultation with the advisor. Although only one of the 3 courses is required, taking all 3 is strongly encouraged. If students take more than one of these courses, the additional course(s) will count towards the elective coursework requirement.

MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)

Required Coursework (4 credits)
Take both of the following courses. Take MICA 8094 twice (fall and spring semester of the first year) for 2 credits.

MICA 8012 - Writing and Reviewing a Research Proposal (2.0 cr)
MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)

Practicum and Seminar Coursework
Take all of the following courses. Take MICA 5000 twice; MICA 8910 4 times; and MICA 8920 4 times.

MICA 5000 - Practicum: Teaching (0.0 cr)
MICA 8910 - Seminar: Faculty Research Topics (0.0 cr)
MICA 8920 - Seminar: Student Research Topics (0.0 cr)

Elective Coursework
Select electives, in consultation with the advisor, to complete the 24 course credits required. Use of 4xxx- and 5xxx-level courses is restricted to either two 5-level courses or one 4- and one 5-level course.

BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
BIOC 5351 - Protein Engineering (3.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5960 - Biophysical Spectroscopy (2.0 cr)
BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
BIOL 8100 - Improvisation for Scientists (1.0 cr)
BTHX 5610 - Research & Publication Seminar (1.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
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<td>Systems Analysis of Biological Processes (3.0 cr)</td>
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<td>Special Topics (1.0 - 4.0 cr)</td>
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<td>CMB 5571</td>
<td>Pathogenomics and Molecular Epidemiology - Learning to Fly (3.0 cr)</td>
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<td>Special Topics (1.0 - 4.0 cr)</td>
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<td>HINF 5440</td>
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<td>Python Programming Essentials for the Health Sciences (1.0 cr)</td>
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<td>LAAS 5311</td>
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<td>PMB 5111</td>
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<td>VMED 5180</td>
<td>Ecology of Infectious Disease (3.0 cr)</td>
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</table>

**Thesis Credits**

Take at least 24 doctoral thesis credits.

MICA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Joint- or Dual-degree Coursework:**MD/PhD-Microbiology, Immunology, and Cancer Biology
Student may take a total of 15 credits in common among the academic programs.
Twin Cities Campus
Molecular Pharmacology and Therapeutics Minor
Pharmacology
Medical School

Link to a list of faculty for this program.

Contact Information:
6-120 Jackson Hall
321 Church St SE
Minneapolis, MN 55455
(612) 626-1248
Email: phclgrad@umn.edu
Website: https://med.umn.edu/pharmacology/education-training/graduate-program

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of drugs, the mechanisms through which they affect living systems, and the ways in which drugs are acted upon by living systems. A drug is defined as any foreign entity that exerts an effect on a biological system, whereas a therapeutic is a drug that is intentionally administered in order to elicit a favorable outcome. Investigators in the program in Molecular Pharmacology and Therapeutics (MPaT) focus on developing greater insight into the molecular mechanisms that determine biological responses to therapeutic agents, and how underlying biological variation impacts these responses. In addition, MPaT program faculty strive to develop a greater understanding of basic mechanisms of molecular biology, and in particular how these processes are altered in disease states. The ultimate objective of these latter studies is to gain insight that can lead to the development of future novel therapeutic agents. The MPaT graduate minor is designed to prepare students academically and professionally in the field of pharmacological research to make them competent as scientists and competitive as job candidates. Students who have earned their minor from this program occupy a diverse array of high-level positions in the fields of scientific research, drug development and discovery, and medical outreach. The MPaT graduate program consists of 74 faculty trainers, each of whom is equipped to offer students training in highly diverse research areas. Minor students can expect individualized mentorship and training from their advisors. For their part, students are expected to perform at a high level in the lab and classroom, produce publishable scientific data, and to adhere to the standards established by their advisor, the MPaT graduate program, the Department of Pharmacology, and the University.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the MPaT director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor field courses offered on both the A/F and S/N grading basis must be taken A/F.

The minimum cumulative GPA for minor field coursework is 3.00.
Required Coursework (9 to 12 credits)
Masters students select 9 credits, and doctoral students select 12 credits from the following in consultation with the MPaT director of graduate studies. Other courses can be applied with MPaT director of graduate studies approval.

- PHCL 5109 - Introduction to Scientific Communication (1.0 - 18.0 cr)
- PHCL 5110 - Introduction to Pharmacology (3.0 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- PHCL 5112 - Foundations of Biomedical Research (1.0 - 2.0 cr)
- PHCL 8026 - Neuro-Immune Interactions (3.0 cr)
- PHCL 8208 - Neuropsychopharmacology (3.0 cr)
- PHCL 8209 - Substance Abuse at the Bedside (1.0 cr)
- PHCL 8211 - Advanced Pharmacology (5.0 cr)
- PHCL 8220 - The Ethical Scientist (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Pharmacology is the study of drugs, the mechanisms through which they affect living systems, and the ways in which drugs are acted upon by living systems. A drug is defined as any foreign entity that exerts an effect on a biological system, whereas a therapeutic is a drug that is intentionally administered in order to elicit a favorable outcome. Investigators in the program in Molecular Pharmacology and Therapeutics (MPaT) focus on developing greater insight into the molecular mechanisms that determine biological responses to therapeutic agents, and how underlying biological variation impacts these responses. In addition, MPaT program faculty strive to develop a greater understanding of basic mechanisms of molecular biology, and in particular how these processes are altered in disease states. The ultimate objective of these latter studies is to gain insight that can lead to the development of future novel therapeutic agents. The MPaT graduate program is designed to prepare students academically and professionally in the field of pharmacological research to make them competent as scientists and competitive as job candidates. Students who have earned their MS from this program occupy a diverse array of high-level positions in the fields of scientific research, drug development and discovery, and medical outreach. The MPaT graduate program consists of 74 faculty trainers, each of whom is equipped to offer students training in highly diverse research areas. MS students can expect individualized mentorship and training from their advisors. For their part, students are expected to perform at a high level in the lab and classroom, produce publishable scientific data, and to adhere to the standards established by their advisor, the MPaT graduate program, the Department of Pharmacology, and the University.
- Total Score: 7
- Listening Score: 7
- Reading Score: 7
- Writing Score: 7
- Speaking Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 25 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 25 major credits and 5 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: A research project the format of which is determined by the student's advisor and committee.

Plan C: Plan C requires 17 major credits and 13 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of C earned for each.

Required Courses (17 to 25 credits)

All students take 4 credits of PHCL 5109. Plan A and Plan B students take PHCL 8100 twice for a total of 8 credits. Plan C students are exempt from the PHCL 8100 requirement.

- PHCL 5108 - Introduction to Laboratory Research (4.0 cr)
- PHCL 5109 - Introduction to Scientific Communication (1.0 - 18.0 cr)
- PHCL 5110 - Introduction to Pharmacology (3.0 cr)
- PHCL 8211 - Advanced Pharmacology (5.0 cr)
- PHCL 8220 - The Ethical Scientist (1.0 cr)

Electives

Plan B and Plan C students select electives in consultation with the advisor to meet the required 30-credit minimum.

- BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
- CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
- CMB 5340 - Structural Biology in Biomedical Research (2.0 cr)
- GERO 8021 - Application of Proteomics to Aging (1.0 cr)
- GERO 8022 - Fostering a Career in Aging Research (1.0 cr)
- MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- MICA 8013 - Translational Cancer Research (2.0 cr)
- MLSP 5011W - Professional Issues in the Health Care Community [WI] (2.0 cr)
- MLSP 5311 - Fundamental Biomedical Laboratory Techniques (4.0 cr)
- MLSP 5511 - Principles of Immunobiology (3.0 cr)
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 8026 - Neuro-Immune Interactions (3.0 cr)
- OBIO 5010 - Molecular Virology (1.0 cr)
- OBIO 5020 - Virus Pathogenesis and Host Interactions (1.0 cr)
- PHAR 6738 - Pharmacokinetics (3.7 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- PHCL 8208 - Neuropsychopharmacology (3.0 cr)
- PHCL 8209 - Substance Abuse at the Bedside (1.0 cr)
- PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)

Plan Options

Plan A
Thesis Credits
  Take 10 master's thesis credits.
  PHCL 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Molecular Pharmacology and Therapeutics PhD
Pharmacology
Medical School

Link to a list of faculty for this program.

Contact Information:
6-120 Jackson Hall
321 Church St SE
Minneapolis, MN 55104
(612)626-1248
Email: phclorad@umn.edu
Website: https://med.umn.edu/pharmacology/education-training/graduate-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of drugs, the mechanisms through which they affect living systems, and the ways in which drugs are acted upon by living systems. A drug is defined as any foreign entity that exerts an effect on a biological system, whereas a therapeutic is a drug that is intentionally administered in order to elicit a favorable outcome. Investigators in the program in Molecular Pharmacology and Therapeutics (MPaT) focus on developing greater insight into the molecular mechanisms that determine biological responses to therapeutic agents, and how underlying biological variation impacts these responses. In addition, MPaT program faculty strive to develop a greater understanding of basic mechanisms of molecular biology, and in particular how these processes are altered in disease states. The ultimate objective of these latter studies is to gain insight that can lead to the development of future novel therapeutic agents. The MPaT graduate program is designed to prepare students academically and professionally in the field of pharmacological research to make them competent as scientists and competitive as job candidates. Students who have earned their PhD from this program occupy a diverse array of high-level positions in the fields of scientific research, drug development and discovery, and medical outreach. The MPaT graduate program consists of 74 faculty trainers, each of whom is equipped to offer students training in highly diverse research areas. PhD students can expect individualized mentorship and training from their advisors. For their part, students are expected to perform at a high level in the lab and classroom, produce publishable scientific data, and to adhere to the standards established by their advisor, the MPaT graduate program, the Department of Pharmacology, and the University.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A four-year degree in a basic sciences discipline is required for admission

Other requirements to be completed before admission:
Admission to the MPaT program requires a four-year degree (or its equivalent) in a basic sciences discipline, transcripts, three letters of recommendation, a diversity statement, and a statement of career objectives. Applicants whose first language is not English or who have not completed post-secondary education at an approved English-speaking institution are required to demonstrate English-language proficiency by submitting TOEFL or IELTS scores with their application.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Listening Score: 25
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Internet Based - Speaking Score: 25
• IELTS
  - Total Score: 7
  - Listening Score: 7
  - Reading Score: 7
  - Writing Score: 7
  - Speaking Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students are required to maintain a GPA of 3.0. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.

Required Courses (24 credits)
Take the following courses. Take PHCL 8100 twice for a total of 8 credits, 2 credits of PHCL 5112, 2 credits of PHCL 8200, and 3 credits of PHCL 8221. All courses, with the exception of PHCL 8100, must be taken A-F and be graded B or higher.

PHCL 5110 - Introduction to Pharmacology (3.0 cr)
PHCL 5112 - Foundations of Biomedical Research (1.0 - 2.0 cr)
PHCL 8100 - Laboratory Research in Pharmacology (4.0 cr)
PHCL 8200 - SciComm I: Critical Analysis & Publishing (1.0 - 2.0 cr)
PHCL 8211 - Advanced Pharmacology (5.0 cr)
PHCL 8220 - The Ethical Scientist (1.0 cr)
PHCL 8221 - SciComm II: Writing & Research Presentation (2.0 - 3.0 cr)

Thesis Credits
Take 24 doctoral thesis credits.

PHCL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 32
- This program requires summer semesters for timely completion.
- NSCI 5551 Cell & Molecular Neurobiology Lab is held at the Itasca Biological Station in Shevlin, Minnesota the first semester the first semester of the program.

- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Neuroscience does not admit students directly to the MS program.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain, and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Neuroscience does not admit students directly to the MS program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 22 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Summer - First Year (4 credits)
Take the following course or, with advisor approval, a substitute course:
NSC 5551 - Itasca Cell and Molecular Neurobiology Laboratory (4.0 cr)
**Fall - First Year (8.5 Credits)**
Take the following courses or, with advisor approval, substitute courses. Take 1-2 credit of NSC 8334.
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 8321 - Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)
- NSC 8334 - Laboratory Neuroscience (1.0 - 3.0 cr)

**Spring - First Year (9.5 Credits)**
Take the following courses or, with advisor approval, substitute courses. Take 2-3 credit of NSC 8334.
- NSC 5661 - Behavioral Neuroscience (3.0 cr)
- NSC 8111 - Quantitative Neuroscience (3.0 cr)
- NSC 8211 - Developmental Neurobiology (4.0 cr)
- NSC 8321 - Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)
- NSC 8334 - Laboratory Neuroscience (1.0 - 3.0 cr)

**Spring - Second Year (0.5 credits)**
Take the following course or, with advisor approval, substitute course.
- NSC 8321 - Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)

**Thesis Credits**
Take 10 master's thesis credits.
- NSC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Neuroscience Minor
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Coursework (4 credits)
All students pursuing the minor must take one of the following courses:

- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)

Electives (8 credits)
All students pursuing the minor must take at least eight elective credits, selected in consultation with the Neuroscience director of graduate studies.

- NSC 5203 - Basic and Clinical Vision Science (3.0 cr)
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 5462 - Neuroscience Principles of Drug Abuse (2.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661 - Behavioral Neuroscience (3.0 cr)
- NSC 8026 - Neuro-Immune Interactions (3.0 cr)
- NSC 8111 - Quantitative Neuroscience (3.0 cr)
- NSC 8208 - Neuropsychopharmacology (3.0 cr)
- NSC 8211 - Developmental Neurobiology (4.0 cr)
- NSC 8320 - Readings in Neurobiology (1.0 - 4.0 cr)
- NSC 8411 - Teaching in Neuroscience (1.0 cr)
- NSC 8481 - Advanced Neuropharmaceutics (4.0 cr)
- NSCI 4101 - Development of the Nervous System: Cellular and Molecular Mechanisms (3.0 cr)
- NSCI 4105 - Neurobiology Laboratory I (3.0 cr)
**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Doctoral**

**Masters**
Twin Cities Campus

Neuroscience Ph.D.

Neuroscience
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street SE, Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- NSCI 5551 Cell & Molecular Neurobiology Lab is held at the Itasca Biological Station in Shevlin, Minnesota the first semester the first semester of the program.

- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Applicants whose native language is not English are required to take the TOEFL and obtain a minimum score of 625 (paper) or 107 (Internet); or obtain 6.5 on the IELTS examination. There is no minimum GPA requirement to apply.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 107
  - Paper Based - Total Score: 625
- IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

24 credits are required in the major.
24 thesis credits are required.

Plan A: Plan A requires 23 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The neuroscience PhD curriculum begins in the summer session with the intensive laboratory course in cellular and molecular neurobiology (NSC 5551), held at the Itasca Biological Station and Laboratories.

While taking courses, students explore research opportunities in the faculty’s laboratories and thereby select a thesis advisor.

**Summer - First Year (4 credits)**
- Take the following course or, with DGS approval, a substitute course.
  - NSC 5551 - Itasca Cell and Molecular Neurobiology Laboratory (4.0 cr)

**Fall - First Year (8.5 credits)**
- Take the following courses or, with DGS approval, substitute courses. Take 1-2 credits of NSC 8334.
  - NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
  - NSC 5561 - Systems Neuroscience (4.0 cr)
  - NSC 8321 - Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)
  - NSC 8334 - Laboratory Neuroscience (1.0 - 3.0 cr)

**Spring - First Year (9.5 credits)**
- Take the following courses or, with DGS approval, substitute courses. Take 2-3 credits of NSC 8334.
  - NSC 5661 - Behavioral Neuroscience (3.0 cr)
  - NSC 8111 - Quantitative Neuroscience (3.0 cr)
  - NSC 8211 - Developmental Neurobiology (4.0 cr)
  - NSC 8321 - Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)
  - NSC 8334 - Laboratory Neuroscience (1.0 - 3.0 cr)

**Fall - Second Year (2 credits)**
- Take the following courses or, with DGS approval, substitute courses.
  - NSC 5xxx

**Spring - Second Year (0.5 credits)**
- Take the following course or, with DGS approval, substitute course.
  - NSC 8321 - Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)

**Thesis Credits**
- Take at least 24 doctoral thesis credits.
  - NSC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Orthoptics Post-baccalaureate Certificate
Ophthalmology
Medical School

Link to a list of faculty for this program.

Contact Information:
Minnesota Lions Children's Eye Clinic
(University of Minnesota Physicians and University of Minnesota Masonic Children's Hospital)
701 25th Ave S. Ste 300
Minneapolis, MN 55454
612-365-8365
612-365-8351 (Fax)
Email: kmerrill@umphysicians.umn.edu
Website: http://www.med.umn.edu/ophthalmology/education-training/orthoptic-program

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 14 to 28
- This program requires summer semesters for timely completion.
- Degree: Orthoptics PostBaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Orthoptics post-baccalaureate certificate program is a vital part of the ophthalmic health care profession. This is a specialized profession, the focus of which is the evaluation and treatment of disorders of vision, eye movements, and eye alignment in children and adults. The study of orthoptics follows a logical sequence of studies vital to the understanding of the visual system. The didactic education is integrated with practical clinical experience. Orthoptists work with ophthalmologists, eye physicians and surgeons, as part of the medical team. They are employed in a variety of settings, including university and teaching hospitals, children's hospitals, and solo or multi-specialty group medical practices. An orthoptist sees a variety of patients of all ages, although due to the nature of their visual disorders, the majority of the patients are young children; some individuals with multiple health concerns are also evaluated as they commonly have ocular/binocular problems.

Students who successfully complete the Orthoptics post-baccalaureate certificate are eligible to sit for the written and practical examinations, administered by the American Orthoptic Council, required for national certification.

Accreditation
This program is accredited by American Orthoptic Council

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

Other requirements to be completed before admission:
All applicants must have an earned baccalaureate degree with a minimum GPA of 2.50.

Applicants to the accelerated certificate also must provide confirmation of:
ophthalmic tech program completion, and
COMT/COT certification.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Each course includes 35+ clinical hours/week under supervision of a staff orthoptist/pediatric ophthalmologist.

Required Coursework (28 credits)
Students admitted to the full 28-credit post-baccalaureate certificate program take OPH 5201, 5301, and 5401 during the first year of study, and OPH 5501, 5601, and 5701 the second year of study for a total of 28 credits.

OPH 5201 - Orthoptics I (4.0 cr)
OPH 5301 - Orthoptics II (5.0 cr)
OPH 5401 - Orthoptics III (5.0 cr)
OPH 5501 - Orthoptics IV (4.0 cr)
OPH 5601 - Orthoptics V (5.0 cr)
OPH 5701 - Orthoptics VI (5.0 cr)

Accelerated Program Required Coursework (14 credits)
Students admitted to the accelerated 14-credit certificate program take OPH 5501, 5601, and 5701 to meet their 14-credit requirement.

OPH 5501 - Orthoptics IV (4.0 cr)
OPH 5601 - Orthoptics V (5.0 cr)
OPH 5701 - Orthoptics VI (5.0 cr)
Twin Cities Campus
Otolaryngology Ph.D. Otol.
Otolaryngology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Otolaryngology, MMC 396, 420 Delaware Street SE, Minneapolis, MN 55455 (612-625-7692; fax: 612-625-2101)
Website: http://www.ent.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy in Otolaryngology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students in both clinical and experimental aspects of otolaryngology. The Ph.D.Otol. degree requires a publishable thesis. Rotations at University of Minnesota Medical Center-Fairview, Minneapolis Veterans Administration Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Hennepin County Medical Center provide a wide range of opportunity for clinical education and surgical experience.

Opportunities for independent research are provided in the areas of audiology, auditory electrophysiology, auditory neurophysiology, basic sciences research, biochemistry, cancer biology, cell biology and genetics, chemical senses, clinical epidemiology, education research, electron microscopy, electrophysiology, histochemistry, laryngeal physiology, mandibular bone physiology, microvascular tissue transfer, morphometry, outcomes research, psychoacoustics, psychometrics, skin-flap physiology, temporal bone pathology, tumor immunology, and vestibular physiology. Graduates of the program have careers in teaching, research, and professional practice.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Requires an M.D. degree.

Other requirements to be completed before admission:
Doctorate will be completed in conjunction with otolaryngology residency.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Coursework will vary depending on preparation and the research undertaken. An advisory committee, including the student, the advisor, and the director of graduate studies, determines coursework. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies.

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Information current as of November 07, 2022
All students are expected to publish a research paper in a peer-reviewed journal. Students are concurrently in otolaryngology residency and usually take five to six years to complete research, course, and dissertation requirements.

**Thesis Credits**
Take 24 doctoral thesis credits.
**OTOL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**
Twin Cities Campus
Physical Therapy D.P.T.
Rehabilitation Medicine Administration
Medical School

Contact Information:
Division of Physical Therapy, 420 Delaware Street SE, MMC 388, Minneapolis, MN 55455, (612-624-2662; fax: 612-625-4274)
Email: ruuda@umn.edu
Website: https://www.med.umn.edu/rehabmedicine/about/divisions/physical-therapy/doctor-physical-therapy

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 137
- This program requires summer semesters for timely completion.
- Courses for the DPT are taught on the Twin Cities East Bank Campus for the first seven semesters (including summers), with numerous off-site clinical education opportunities scheduled throughout. During the student's 3rd year, the student will complete four full-time clinical experiences, which occur off-campus in various physical therapy settings.
- Degree: Doctor of Physical Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Division of Physical Therapy Program, a division within the Department of Rehabilitation Medicine, offers a professional doctoral degree in physical therapy (DPT). Physical therapy is a healthcare discipline involved with the study and rehabilitation of movement impairments, such as muscular weakness, impaired coordination, joint stiffness, and pain, which can lead to functional problems affecting self care, employment, ambulation, etc. Graduates are prepared to promote proper health care and quality of living by maximizing human movement following disease or injury or by preventing its loss. The program requires three years of year-round, full-time graduate study (9 semesters including summers). Academic coursework, clinical education, and research activity are completed during the first seven semesters. The final two semesters are devoted to clinical rotations.

Accreditation
This program is accredited by Commission on Accreditation in Physical Therapy Education (CAPTE)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The University of Minnesota Division of Physical Therapy has no required or preferred undergraduate major. Any baccalaureate degree or equivalent from an accredited institution is accepted.

Other requirements to be completed before admission:
To be eligible for admission, applicants must complete a baccalaureate degree, or its foreign equivalent, from an accredited institution by June 1 of the year of admission, including all required prerequisite courses or their program-approved equivalents.

Applicants must complete at least 40 observation hours (shadow/volunteer/work) in a clinical physical therapy setting. Exposure to multiple and varied areas of practice in physical therapy and additional health care exposure are considered important preparation for entry into the program.

TOEFL is required for international students.

Two letters of recommendation are also required. One letter must be from a practicing physical therapist with whom the applicant completed observation hours.

Special Application Requirements:
Below is a list of required prerequisite coursework applicants must complete to apply to the program. Courses must be taken for college credit and graded A-F with a received minimum letter grade of C. The exception is medical terminology, which will be accepted.
pass/fail. Courses may be taken at any accredited college or university. Up to two prerequisite courses may be listed as in progress - either currently being taken or planned to take and complete by June 1 of the year of admission. The program will also accept two AP scores of 4 or above or two IB scores of 6 or above to meet prerequisite requirements. It is recommended that these courses be taken within the previous five years.

- General Biology, with lab
- A second Biology, with lab
- General Chemistry, with lab
- A second Chemistry, with lab
- Human Anatomy, with lab
- Human Physiology, with lab
- General Physics I (covering mechanics and electricity), with lab
- General Physics II, with lab
- General Psychology
- Abnormal Psychology
- Statistics (ANOVA and regression analysis content strongly recommended)
- Math (college-level Algebra or higher)
- Medical Terminology

Distance learning courses are accepted; however, labs must be taken on-site unless prior approval is given by the Admissions Chair.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Listening Score: 18
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 21
  - Internet Based - Speaking Score: 26

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

137 credits are required in the major.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 6 semesters must be completed before filing a Degree Program Form.

**Year 1 Summer (7 credits)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT 6058</td>
<td>6.0 cr</td>
</tr>
<tr>
<td>PT 6212</td>
<td>1.0 cr</td>
</tr>
</tbody>
</table>

**Year 1 Fall (17 credits)**

6213 changes to 1 credit in Fall 2022.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT 6213</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>PT 6231</td>
<td>5.0 cr</td>
</tr>
<tr>
<td>PT 6280</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PT 6281</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PT 6340</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Year 1 Spring (15 credits)**

For Spring 2023, NSCI 6112 will be replaced with PT 6285 for 4 credits. PT 6214 changes to 1 credit.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT 6002</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>PT 6214</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>PT 6221</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>PT 6282</td>
<td>4.0 cr</td>
</tr>
</tbody>
</table>
PT 6285 Neuroscience for Rehabilitation  
PT 8132 - Research Seminar (1.0 cr)

**Year 2 Summer (15 credits)**  
Take PT 8193 for 1 credit. PT 6250 changes to 3 credits in Summer 2023. Students will take PT 6217 for 1 credit beginning Summer 2023.  
PHAR 6800 - Rehabilitation Pharmacotherapy (2.0 cr)  
PT 6217 Integrated Clinical Education I  
PT 6241 - Movement and Pathokinesiology (3.0 cr)  
PT 6250 - Acute Care in Physical Therapy (2.0 cr)  
PT 6251 - Integument (2.0 cr)  
PT 6252 - Pathophysiology (3.0 cr)  
PT 8193 - Research Problems (1.0 - 6.0 cr)

**Year 2 Fall (15 credits)**  
Take PT 8193 for 2 credits.  
PT 6215 - Clerkship III: The Physical Therapist in Today's Society (1.0 cr)  
PT 6283 - Musculoskeletal Rehabilitation 1 (6.0 cr)  
PT 6286 - Neurehabilitation I (3.0 cr)  
PT 6293 - Essentials of Rehabilitation Research (3.0 cr)  
PT 8193 - Research Problems (1.0 - 6.0 cr)

**Year 2 Spring (16 credits)**  
Take PT 8193 for 2 credits.  
PT 6216 - Clerkship IV: Advocacy and Adjustment to Disability (1.0 cr)  
PT 6284 - Musculoskeletal Rehabilitation II (5.0 cr)  
PT 6287 - Neurehabilitation II (8.0 cr)  
PT 8193 - Research Problems (1.0 - 6.0 cr)

**Year 3 Summer (14 credits)**  
Students will also take PT 6218 for 1 credit beginning Summer 2024.  
PT 6285 Integrated Clinical Education II  
PT 6288 - Pediatric Rehabilitation (3.0 cr)  
PT 6290 - Contemporary Physical Therapist Practice (4.0 cr)  
PT 6294 - Clinical Integration (3.0 cr)  
Electives  
PT 6401 - Pediatric Rehabilitation Elective (3.0 cr)  
or PT 6402 - The Shoulder in Sports (3.0 cr)  
or PT 6403 - Topics in Aging (3.0 cr)  

**Year 3 Fall (18 credits)**  
PT 6295 - Clinical Internship I (9.0 cr)  
PT 6296 - Clinical Internship II (9.0 cr)

**Year 3 Spring (20 credits)**  
PT 6297 - Clinical Internship III (10.0 cr)  
PT 6298 - Clinical Internship IV (10.0 cr)

**Joint- or Dual-degree Coursework:** Doctorate in Physical Therapy / PhD in Rehabilitation Science  
Student may take a total of 18 credits in common among the academic programs.
Twin Cities Campus
Rehabilitation Science M.S.
Rehabilitation Medicine Administration
Medical School

Link to a list of faculty for this program.

Contact Information:
Rehabilitation Science Graduate Program, 420 Delaware Street SE - MMC 388, Minneapolis, MN, 55455
Phone: 612-625-3966
Email: adamc002@umn.edu
Website: https://med.umn.edu/rehabmedicine/about/divisions/rehabilitation-science

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 33
- This program does not require summer semesters for timely completion.
- No
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the graduate program in Rehabilitation Science is to discover and disseminate rehabilitation knowledge and improve the quality of life, participation, health, performance, and well-being of people in Minnesota and throughout the world. The mission further encompasses the cultivation of premier leaders and researchers in academia, industry, and clinical environments to transform the science and practice of rehabilitation. The program is interdisciplinary, with student and faculty backgrounds in physical therapy, occupational therapy, exercise physiology, biomedical engineering, and a variety of other biology and health care backgrounds. The programs philosophy is to provide students with a strong foundation in research methodology; a concentrated educational and research experience tailored toward a students specific area of interest in rehabilitation science; and a working knowledge of the importance of a collaborative and interdisciplinary approach to the scientific process.

Note: The Rehabilitation Science program does not normally admit students to the MS degree. The exception is for students who wish to pursue the integrated Biomedical Engineering BS /Rehabilitation Science MS program. For more information, contact the Rehabilitation Science graduate program office.

Accreditation
This program is accredited by Not applicable.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree or US equivalent in a related discipline.

Not applicable.

Special Application Requirements:
In addition to the University's application (including personal statement and fee), applicants must submit the following materials: unofficial transcripts; three letters of recommendation; for international students, test of English language. Student must also have an agreed-upon faculty adviser at the time of applying. Compatibility of research interests is a major determinant in the student/adviser relationship.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 88
Program Requirements

Plan A: Plan A requires 20 major credits, 3 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 27 major credits and 3 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is determined in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Coursework (20 to 27 credits)

Plan A students select at least 20 credits, and Plan B students select at least 27 credits from the following list, in consultation with the advisor. For both Plan A and Plan B students, at least 14 of the credits must be from RSC courses.

RSC 5058 - Anatomy for Rehabilitation Science (1.0 - 6.0 cr)
RSC 5060 - Lower Extremity Anatomy Intensive (2.0 cr)
RSC 5065 - Upper Extremity Anatomy Intensive (2.0 cr)
RSC 5101 - Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences (1.0 cr)
RSC 5106 - Introduction to Rehabilitation Science (1.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
RSC 5281 - Physiology for Physical Rehabilitation (2.0 - 4.0 cr)
RSC 5294 - Independent Study in Rehabilitation Science (1.0 - 3.0 cr)
RSC 5300 - Autonomic Nervous System (ANS) Function (2.0 cr)
RSC 5306 - Scientific and Professional Presentation (1.0 cr)
RSC 5310 - Cardiopulmonary Physiology and Rehabilitation (2.0 - 4.0 cr)
RSC 5402 - The Shoulder in Sports Rehabilitation Science (3.0 cr)
RSC 5404 - Applied Shoulder Anatomy and Biomechanics (1.0 cr)
RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
RSC 5842 - Teaching and Learning in Rehabilitation Science (1.0 cr)
RSC 8106 - Critical Analysis of Scientific Literature (2.0 cr)
RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
RSC 8135 - Human Kinematics (3.0 cr)
RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
RSC 8185 - Problems in Rehabilitation Science (1.0 - 3.0 cr)
RSC 8188 - Teaching Practicum (1.0 - 5.0 cr)
RSC 8192 - Essentials in Rehab Research (3.0 cr)
RSC 8206 - Grant Writing (2.0 cr)
RSC 8235 - Human Kinetics (3.0 cr)
RSC 8282 - Problems in Human Movement (4.0 cr)
RSC 8306 - Peer Review and Publication (2.0 cr)
RSC 8332 - Quantitative Research in Rehab Science (2.0 cr)
RSC 8431 - Qualitative Inquiry in Occupational Therapy (2.0 cr)

Statistics Requirement (3 credits)
All master's students must take one of the two statistics courses below, or another statistics course approved by the advisor, for at least three credits.
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)

Plan Options

Plan A
Take at least 10 master's thesis credits.
RSC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Integrated BS-Biomedical Engineering/MS-Rehabilitation Science
The Integrated BS Biomedical Engineering / MS Rehabilitation Science program offers students the opportunity to earn a bachelor's degree and a master's degree in a shortened amount of time. The integrated program offers several benefits, including streamlined admissions from the undergraduate to the graduate program, and flexibility in fulfilling required courses for both degrees during the senior year.

Students pursuing the integrated BS/MS may complete either the Plan A or Plan B option for the Rehabilitation Science master's degree. Both the BS and MS degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MS degree may count credits originally planned for the graduate program toward their BS degree with approval of the Biomedical Engineering advisors.

For more information regarding the integrated BS/MS degree, including eligibility requirements, contact the Biomedical Engineering or Rehabilitation Science program office.
Twin Cities Campus
Rehabilitation Science Ph.D.
Rehabilitation Medicine Administration
Medical School

Contact Information:
Rehabilitation Science Graduate Program, 420 Delaware Street SE - MMC 388, Minneapolis, MN, 55455
Phone: 612-625-3966
Email: adamc002@umn.edu
Website: https://med.umn.edu/rehabmedicine/about/divisions/rehabilitation-science

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- No.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the graduate program in Rehabilitation Science is to discover and disseminate rehabilitation knowledge and improve the quality of life, participation, health, performance, and well-being of people in Minnesota and throughout the world. The mission further encompasses the cultivation of premier leaders and researchers in academia, industry, and clinical environments to transform the science and practice of rehabilitation. The program is interdisciplinary, with student and faculty backgrounds in physical therapy, occupational therapy, exercise physiology, biomedical engineering and a variety of other biology and health care backgrounds. The programs philosophy is to provide students with a strong foundation in research methodology; a concentrated educational and research experience tailored toward a students specific area of interest in rehabilitation science; and a working knowledge of the importance of a collaborative and interdisciplinary approach to the scientific process.

Accreditation
This program is accredited by Not applicable.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree or US equivalent in a related discipline is minimal requirement.

Professional, graduate, or master's degree preferred but not required.

Other requirements to be completed before admission:
Applicants must hold a bachelor's or graduate degree, or accredited US equivalent, in a discipline related to rehabilitation; for example, biomedical engineering, kinesiology, medicine, occupational therapy, physical therapy, public health, or speech/audiology. Depending on the educational background of the applicant, admission may be contingent upon completion of selected prerequisite coursework.

Special Application Requirements:
In addition to completing and submitting the University's Graduate School application (which includes submission of a personal statement, diversity statement, and upload of CV/resume), applicants must submit the following materials: transcripts from all institutions attended; three letters of recommendation; and TOEFL and/or IELTS scores for international students. Student must also have an agreed-upon faculty adviser at the time of application. Compatibility of research interest is a major determinant in the student/adviser relationship.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 88
- Internet Based - Listening Score: 21
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 21
- Internet Based - Speaking Score: 23

IELTS
- Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Professional Development Coursework (8 credits)
The following Rehabilitation Science courses are required:
- RSC 5106 - Introduction to Rehabilitation Science (1.0 cr)
- RSC 5306 - Scientific and Professional Presentation (1.0 cr)
- RSC 8106 - Critical Analysis of Scientific Literature (2.0 cr)
- RSC 8206 - Grant Writing (2.0 cr)
- RSC 8306 - Peer Review and Publication (2.0 cr)

Statistics Coursework (6 to 8 credits)
Take the following Public Health or Educational Psychology series. Other statistics courses may be selected with advisor approval.

Public Health Statistics Series
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

or Educational Psychology Statistics Series
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Electives
Take elective credits, at least 8 credits of which must be from RSC coursework, to complete the 36 course credits required for the degree. Coursework is selected in consultation with the advisor.

- RSC 5058 - Anatomy for Rehabilitation Science (1.0 - 6.0 cr)
- RSC 5060 - Lower Extremity Anatomy Intensive (2.0 cr)
- RSC 5065 - Upper Extremity Anatomy Intensive (2.0 cr)
- RSC 5101 - Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences (1.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
- RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- RSC 5281 - Physiology for Physical Rehabilitation (2.0 - 4.0 cr)
- RSC 5294 - Independent Study in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 5300 - Autonomic Nervous System (ANS) Function (2.0 cr)
- RSC 5310 - Cardiopulmonary Physiology and Rehabilitation (2.0 - 4.0 cr)
- RSC 5402 - The Shoulder in Sports Rehabilitation Science (3.0 cr)
- RSC 5404 - Applied Shoulder Anatomy and Biomechanics (1.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (3.0 cr)
- RSC 5842 - Teaching and Learning in Rehabilitation Science (1.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Human Kinematics (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8185 - Problems in Rehabilitation Science (1.0 - 3.0 cr)
RSC 8188 - Teaching Practicum (1.0 - 5.0 cr)
RSC 8192 - Essentials in Rehab Research (3.0 cr)
RSC 8235 - Human Kinetics (3.0 cr)
RSC 8282 - Problems in Human Movement (4.0 cr)
RSC 8332 - Quantitative Research in Rehab Science (2.0 cr)
RSC 8431 - Qualitative Inquiry in Occupational Therapy (2.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
RSC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework: DPT/PhD Student may take a total of 18 credits in common among the academic programs.
Twin Cities Campus
Stem Cell Biology M.S.
Stem Cell Institute
Medical School

Link to a list of faculty for this program.

Contact Information:
Stem Cell Institute, 2001 6th Street S.E., Mail Code 2873, Minneapolis, MN 55455-3007
Email: scbgrad@umn.edu
Website: https://med.umn.edu/stemcell/graduate-programs/master-science-stem-cell-biology

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The stem cell biology master's program is a multidisciplinary program that prepares graduates for a career in research, teaching, or industry within the field of stem cell biology. It offers training in stem cell biology, a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture, lab, and seminar courses in these various disciplines, in addition to stem cell biology. They will interact with members of the Stem Cell Institute through participation in research seminars and journal clubs.

Students who elect Plan A will spend a full calendar year, including summer, conducting research in the laboratory of a stem cell graduate program faculty member. This research will form the basis of the master's thesis.

Students who elect Plan B will conduct research of primary literature resulting in a written paper and seminar on a topic in Stem Cell Biology agreed upon in advance by the student and faculty advisor. Part-time students choosing Plan B are expected to complete the degree within 3 years by taking one to two courses per semester, excluding summers.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A bachelor's degree or foreign equivalent in biological science or a related field.

Special Application Requirements:
Applicants must upload to the University's on-line application website: 1) a personal statement (500 words or less) outlining research interests and long- and short-term goals (NOTE: students applying to Plan A should include information about previous research experience); 2) a curriculum vitae or resume; 3) the names of three individuals whom the student has asked to write letters of recommendation; and 4) unofficial transcripts.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 94
  - Internet Based - Listening Score: 22
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Internet Based - Speaking Score: 26
  - Paper Based - Total Score: 580
- IELTS
  - Total Score: 7

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Information current as of November 07, 2022
Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must demonstrate familiarity with the tools of research and scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively.

Plan Options

**Plan A Course and Thesis**

**Required Plan A Course (1 credit)**
- SCB 5051 - Stem Cell Biology Practical Training Module (1.0 cr)

**Thesis Credits**
- Take 10 master's thesis credits. Students are recommended to take five thesis credits in spring of the first year, and the remaining five in fall of the second year.
- SCB 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B Course**
- Take the following course:
- SCB 5900 - Master's Plan B Research Paper and Presentation (2.0 cr)

**Required Coursework (14 to 15 credits)**
- Plan A and Plan B students take the following courses. All required courses must be taken A-F.

**Core Courses (9 credits)**
- Take SCB 5054 three times for a total of 6 credits.
- SCB 5054 - Stem Cell Institute Research Seminar and Journal Club (2.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)

**Option 1: Molecular Biology Course (3 to 4 credits)**
- Students complete either Option 1 or Option 2.
- Select at least one of the following courses.
- GCD 4034 - Molecular Genetics and Genomics (3.0 cr)
- or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- or Students complete either Option 1 or Option 2.
- Both of the following courses are required.
- BIOC 8007 - Molecular Biology of the Genome (2.0 cr)
- BIOC 8008 - Molecular Biology of the Transcriptome (2.0 cr)

**Other Courses**
- Take at least one of the following courses, or other 5000-level or 8000-level course approved prior to registration by the SCB program, for a minimum of two credits.
- GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
Electives
Take elective credits from the following list, or other courses in consultation with the advisor, to complete the minimum credit requirement.

- BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
- BIOL 4004 - Cell Biology (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- BTHX 5110 - Ethical Issues in Pediatrics (2.0 cr)
- BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
- BTHX 5325 - Biomedical Ethics (3.0 cr)
- BTHX 5400 - Intro Ethics in Health Policy (3.0 cr)
- CMB 5910 - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
- CMB 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5465 - Introduction to Computing for Biologists (3.0 cr)
- GCD 4161 - Developmental Biology (3.0 cr)
- GCD 5005 - Computer Programming for Biology (3.0 cr)
- GCD 5035 - Molecular Cell Biology (3.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8141 - Computational Genomics (3.0 cr)
- GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- MICA 8014 - Small RNA Biology (2.0 cr)
- MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
- MILI 6269 - Medical Device Industry: Business and Public Policy (2.0 cr)
- MILI 6985 - The Health Care Marketplace (2.0 cr)
- MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
- NSC 5461 - Cellular and Molecular Neuroscience (3.0 cr)
- NSC 8002 - Neuro-Immune Interactions (3.0 cr)
- NSC 8011 - Developmental Neurobiology (4.0 cr)
- NSCI 4101 - Development of the Nervous System: Cellular and Molecular Mechanisms (3.0 cr)
- NSCI 5101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
- NSCI 5501 - Neurodegenerative Diseases, Mechanisms to Therapies (3.0 cr)
- PHCL 5110 - Introduction to Pharmacology (3.0 cr)
- PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
- PHSL 5197 - Stress Physiology (1.0 - 3.0 cr)
- PHSL 5221 - Systems and Computational Physiology (3.0 cr)
- PHSL 5211 - Physiology of Inflammation in Disease (3.0 cr)
- PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
- PSY 5063 - Professional Skills Development for Biomedical Scientists (2.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
Twin Cities Campus
Stem Cell Biology Minor
Stem Cell Institute
Medical School

Link to a list of faculty for this program.

Contact Information:
Stem Cell Institute, 2001 6th Street SE, Mail Code 2873, Minneapolis, MN 55455-3007 (612-625-0602; fax: 612-624-2436)
Email: scbgrad@umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2022
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The stem cell biology minor is available to PhD students in relevant programs such as MCDB&G, MiCaB, pharmacology, microbiology, bio-engineering, or a medical or veterinary medicine school program, and who have an interest in stem cell biology. It offers training in stem cell biology, which is a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture and seminar courses, interact with members of the Stem Cell Institute through participation in research seminar and journal clubs, and conduct stem cell research in the laboratory of a stem cell biology graduate program faculty member.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applicants must be admitted to a Ph.D. program and obtain approval from the Stem Cell Biology director of graduate studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

In addition to course requirements, the student's research project must be done in the lab of a Stem Cell Biology faculty member; therefore, students must obtain approval from the Stem Cell Biology director of graduate studies prior to declaring the minor.

The minimum GPA for minor field coursework is 3.00.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Required Courses (5 credits)
Take the following required courses on the A-F grade basis.
SCB 5054 - Stem Cell Institute Research Seminar and Journal Club (2.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
Electives (7 credits)
Select at least seven elective credits in consultation with the Stem Cell Biology director of graduate studies to complete the 12-credit minimum. Elective courses should be taken on the A-F grade basis. Courses required to meet the student's major field requirement
cannot be applied to the minor.

Take 7 or more credit(s) from the following:

- **BIOC 8007** - Molecular Biology of the Genome (2.0 cr)
- **BIOC 8008** - Molecular Biology of the Transcriptome (2.0 cr)
- **BIOC 8401** - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
- **BMEN 5041** - Tissue Engineering (3.0 cr)
- **BMEN 5351** - Cell Engineering (3.0 cr)
- **BMEN 5701** - Cancer Bioengineering (3.0 cr)
- **BTHX 5000** - Topics in Bioethics (1.0 - 4.0 cr)
- **BTHX 5100** - Introduction to Clinical Ethics (3.0 cr)
- **BTHX 5110** - Ethical Issues in Pediatrics (2.0 cr)
- **BTHX 5210** - Ethics of Human Subjects Research (3.0 cr)
- **BTHX 5325** - Biomedical Ethics (3.0 cr)
- **BTHX 5400** - Intro Ethics in Hlth Policy (3.0 cr)
- **BTHX 8000** - Advanced Topics in Bioethics (1.0 - 4.0 cr)
- **CMB 5910** - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
- **CSCI 5461** - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- **CSCI 5465** - Introduction to Computing for Biologists (3.0 cr)
- **GCD 5005** - Computer Programming for Biology (3.0 cr)
- **GCD 5036** - Molecular Cell Biology (3.0 cr)
- **GCD 8008** - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- **GCD 8131** - Advanced Molecular Genetics and Genomics (3.0 cr)
- **GCD 8141** - Computational Genomics (3.0 cr)
- **GCD 8151** - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
- **GCD 8161** - Advanced Cell Biology and Development (2.0 cr)
- **MICA 8003** - Immunity and Immunopathology (4.0 cr)
- **MICA 8004** - Cellular and Cancer Biology (4.0 cr)
- **MICA 8014** - Small RNA Biology (2.0 cr)
- **MILI 6235** - Pharmaceutical Industry: Business and Policy (2.0 cr)
- **MILI 6726** - Medical Device Industry: Business and Public Policy (2.0 cr)
- **MILI 6985** - The Health Care Marketplace (2.0 cr)
- **MILI 6995** - Medical Industry Valuation Laboratory (2.0 cr)
- **NSC 5461** - Cellular and Molecular Neuroscience (3.0 cr)
- **NSC 8026** - Neuro-Immune Interactions (3.0 cr)
- **NSC 8211** - Developmental Neurobiology (4.0 cr)
- **NSCI 5101** - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
- **PHCL 5110** - Introduction to Pharmacology (3.0 cr)
- **PHCL 5112** - Foundations of Biomedical Research (1.0 - 2.0 cr)
- **PHSL 5061** - Principles of Physiology for Biomedical Engineering (4.0 cr)
- **PHSL 5197** - Stress Physiology (1.0 - 3.0 cr)
- **PHSL 5211** - Physiology of Inflammation in Disease (3.0 cr)
- **PHSL 5221** - Systems and Computational Physiology (3.0 cr)
- **PHSL 5510** - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
- **PHSL 8242** - Professional Skills Development for Biomedical Scientists (2.0 cr)
- **PSY 5063** - Introduction to Functional MRI (3.0 cr)
- **PUBH 6450** - Biostatistics I (4.0 cr)
- **PUBH 6451** - Biostatistics II (4.0 cr)
Twin Cities Campus
Surgery M.S. Surg.
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Surgery, University of Minnesota, 420 Delaware Street S.E., MMC 195, Minneapolis, MN 55455 (612-625-3457)
Email: alanpher@umn.edu
Website: http://www.surgery.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 37
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Surgery

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The general surgery residency program trains medical doctors for the practice of surgery and for academic positions. During residency, research trainees spend two to three years in either a basic science laboratory or in clinical translational surgery. The Department of Surgery offers supervised work in its experimental research laboratories, hospital, and outpatient departments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
MD or graduate student in an applicable field.

Other requirements to be completed before admission:
Prospective students must be in the general surgery training program, with two to three clinical years of training completed; physicians interested in an advanced research degree; or individuals with relevant research education and experience. Non-physician applicants should confer with the director of graduate studies prior to applying to determine their potential for the MSSurg degree.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 27 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Core Coursework (18 credits)
Take the following courses, in consultation with the advisor, for 18 credits. Take 4 credits each of SURG 8990, 8992, and 8994.
Alternative course credits can be applied to the core requirement only with approval of the director of graduate studies. All courses must be taken A-F, with minimum earned grade of B.
- PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
- SURG 8202 - Surgical Research (3.0 cr)
- SURG 8990 - Topics in Pancreatology (1.0 - 4.0 cr)
- SURG 8994 - Directed Readings (1.0 - 4.0 cr)
- SURG 8992 - Directed Research (2.0 - 4.0 cr)

Biostatistics Requirement (8 credits)
Both courses must be taken A-F with a minimum earned grade of B.
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
Ethics Requirement (1 credit)
Course must be taken A-F with minimum earned grade of B.
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Thesis Credits (10 credits)
Take at least 10 master's thesis credits.
SURG 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Adult Health/Gerontological Clinical Nurse Specialist Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 21 to 34
- This program requires summer semesters for timely completion.
- Degree: Adult Hlth/Geron Clinical Nurse Spec Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A DNP degree and coursework in 3 of the 5 following subjects: physiology, pathophysiology, pharmacology, pharmacotherapeutics, advanced physical assessment.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vita/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space-available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

3.0 cumulative GPA is required. Please contact the School of Nursing for detailed information about the requirements for this certificate.

Specialty Courses (21 Credits)
Complete the following required specialty courses for the certificate. NURS 6408 must be taken for 1 credit. NURS 6502 must be taken for 3 credits. NURS 7505 must be taken for 2 credits.

- NURS 6405 - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- NURS 6406 - Advanced Practice CNS Roles Across the Lifespan: Practicum (1.0 cr)
- NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
- NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- NURS 7406 - Advanced Nursing Practicum in Adult-Gerontology Health (2.0 cr)
- NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- NURS 7705 - The Adult and Gerontological Clinical Nurse Specialist in Acute Care (2.0 cr)
- NURS 7706 - Implementing the Role of the Clinical Nurse Specialist in Acute Care (1.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 13 credits)
Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 4 credits.

- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
Twin Cities Campus
Adult/Gerontological Primary Care Nurse Practitioner Postgraduate Certificate
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 20 to 33
- This program requires summer semesters for timely completion.
- Degree: Adult/Gerontological Primary Care NP Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv. physiology; adv. pathophysiology; pharmacology; pharmacotherapeutics; adv.health assessment

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A 3.00 cumulative GPA is required. Please contact the School of Nursing for detailed information about the requirements for this certificate.

Specialty Courses (20 Credits)
Complete the following required specialty courses for the certificate. Take NURS 6305 for 2 credits; NURS 6408 for 2 credits; NURS 6502 for 3 credits; NURS 7504 for 1 credit; and NURS 7505 must be taken for 1 credit.

NURS 6305 - Reproductive and Sexual Health Care (3.0 cr)
NURS 6307 - Assessment and Management of Health for APNs Practicum III (1.0 cr)
NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
NURS 7406 - Advanced Nursing Practicum in Adult-Gerontology Health (2.0 cr)
NURS 7502 - Health Care of Older Adults for Adult-Gerontology Nurse Practitioner: Acute and Chronic Management (2.0 cr)
NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 13 Credits)
Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 4 credits.

NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
NURS 5222 - Advanced Human Physiology (2.0 cr)
NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
Twin Cities Campus

Doctor of Nursing Practice D.N.P.
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Office of Student Career & Advancement Services, 5-160 Weaver Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 39 to 100
- This program requires summer semesters for timely completion.
- Degree: Doctor of Nursing Practice

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Doctor of Nursing Practice (DNP) Program is offered as the post-baccalaureate with specialty (12 specialties). The School of Nursing also offers a post-master's DNP program for students who have completed a master's degree in a nursing practice specialty.

The DNP program is an innovative, practice-focused program that prepares students to be leaders in health care, develop quality improvement, and systems problem solving. It prepares nurses to create and lead new models of care delivery for communities locally, across the nation, and around the world. Students work with faculty who are leaders in their fields and on the cutting edge of nursing research and practice. These experts become mentors and guide students through the program. The unique, interdisciplinary core curriculum is divided into the following four areas.

1. DNP core - Includes science of nursing intervention, moral and ethical positions, research, statistics, program evaluation, evidence-based practice, epidemiology, informatics, leadership, health economics, health policy, and teaching and learning.
2. DNP specialty core - Prepares students for advanced clinical practice; includes physiology, pharmacology, pharmacotherapeutics, and advanced health assessment.
3. DNP specialization - Prepares graduates for certification in their chosen specialty by a national certifying body and includes:
   a. Advanced clinical practice with specialty-specific courses for each of the areas of clinical specialization
   b. Other specialization in innovation and leadership, informatics, and integrative health and healing
4. DNP project - Completed by all students in a three-semester sequence during which the project is planned, implemented, evaluated, and disseminated

The School of Nursing and the School of Public Health offer a DNP/MPH-Public Health Practice dual degree program. This dual degree option provides students with a unique opportunity to provide advanced nursing care as leaders of inter-professional health care teams, emphasizing population-focused practice, and quality improvement to impact patient outcomes.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The post-baccalaureate DNP specialty areas and post-master's DNP require an entry-level nursing degree (e.g. BSN, BAN, post-bacc certificate in nursing, or entry-level master of nursing).

A graduate degree is not required for admission to the post-baccalaureate DNP program.

Applicants for the post-master's DNP must hold a master's degree in a nursing practice specialty.
Other requirements to be completed before admission:
The required application process is available on the School of Nursing website at www.nursing.umn.edu. Interviews are by invitation
only and are not granted to all applicants. Application deadlines for the DNP program are available on the School of Nursing website.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
• MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
catalog website.

Program Requirements
39 to 100 credits are required in the major.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students MUST complete coursework according to the program plan appropriate for their term of admission and year plan. Any
modifications to the program plan must be approved by the Specialty Coordinator/Faculty Advisor and Doctoral Programs Coordinator.

Core Coursework (31 credits)
All core courses with the exception of NURS 7110 must be completed with the A-F grade base.
NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
NURS 6200 - Science of Nursing Intervention (3.0 cr)
NURS 7000 - DNP Proseminar (1.0 cr)
NURS 7100 - Quality Improvement and Implementation Science in Health Care (3.0 cr)
NURS 7102 - Scholarly Dissemination and Advanced Professional Engagement (2.0 cr)
NURS 7200 - Economics of Health Care (3.0 cr)
NURS 7300 - Program Planning and Evaluation (3.0 cr)
NURS 7400 - Health Policy Leadership (3.0 cr)
NURS 7600 - Nursing Research and Evidence Based Practice (4.0 cr)
NURS 7610 - System Leadership and Innovation (3.0 cr)
NURS 7900 - Scholarly Teaching and Learning in Nursing (3.0 cr)
NURS 6110 - Epidemiology in Nursing (2.0 cr)
  or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
Take 3 or more credit(s) from the following:
NURS 7110 - NURS 7110 DNP Project Practicum (1.0 - 3.0 cr)

Statistics (3 credits)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
  or PUBH 6414 - Biostatistical Literacy (3.0 cr)

Joint- or Dual-degree Coursework: Doctor of Nursing Practice/Master of Public Health - Public Health Practice (D.N.P./M.P.H.-Public
Health Practice) Student may take a total of 14 credits in common among the academic programs.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.

Adult Health/Gerontological Clinical Nurse Specialist
The DNP program with a specialty in adult health and gerontological nursing as a clinical nurse specialist (CNS) prepares clinical
experts to provide advanced nursing care to adults and older adults in a variety of settings as well as leadership role as advanced
practice nurses.
Graduates work as expert clinicians and consultants in acute care settings, nursing homes, transitional care, and specialty practices. The adult health and gerontological specialty offers leadership preparation for nurses desiring expertise in the management of complex health conditions, working with nurses and interdisciplinary teams and organizations to provide care and services for adults and older adults. Students ground their studies in the science of nursing interventions, moral/ethical issues, and nursing research. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology.

**Required Specialty Coursework**
Complete the following courses for at least 39 credits. 4 credits of NURS 5229 is required; 3 credits of NURS 6502 is required; 2 credits of NURS 7505 is required; 1 credit of NURS 6408; 3 credits of NURS 6501 is required for this specialty.

- **CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
- **NURS 5200** - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- **NURS 5222** - Advanced Human Physiology (2.0 cr)
- **NURS 5226** - Advanced Human Pathophysiology (2.0 cr)
- **NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
- **NURS 5229** - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
- **NURS 6405** - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- **NURS 6406** - Advanced Practice CNS Roles Across the Lifespan: Practicum (1.0 cr)
- **NURS 6407** - Advanced Nursing Care of Older Adults (3.0 cr)
- **NURS 6408** - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
- **NURS 6501** - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- **NURS 6502** - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- **NURS 7202** - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- **NURS 7406** - Advanced Nursing Practicum in Adult-Gerontology Health (2.0 cr)
- **NURS 7505** - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- **NURS 7705** - The Adult and Gerontological Clinical Nurse Specialist in Acute Care (2.0 cr)
- **NURS 7706** - Implementing the Role of the Clinical Nurse Specialist in Acute Care (1.0 cr)

**Adult/Gerontological Primary Care Nurse Practitioner**
The DNP program with a specialty in adult health and gerontological nursing as a nurse practitioner prepares nurses for leadership as advanced practice nurses and clinical experts to provide advanced nursing care to adults and elders in a variety of settings. This DNP program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and practicum experiences, as well as a final internship where the student has the opportunity to focus on a sub-specialty area (e.g., oncology, cardiology, palliative care), if desired. Graduates work in primary care/ambulatory care settings, hospitals, group practices of advanced practice gerontological nurses that manage care of adults and older adults in nursing homes, transitional care settings, assisted living, and specialty practices.

The adult health and gerontological specialty offers leadership preparation for nurses desiring expertise in advanced nursing assessment and management for health promotion and disease prevention, management of complex health conditions, and working with interdisciplinary teams to provide care and services for persons ranging from adolescents, adults, and older adults. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements.

**Required Specialty Coursework**
Complete the following courses for 39 credits. Specialty requirements for Variable credit course: NURS 5229 = 4 credits; NURS 6305 = 3 credits; NURS 7504 = 1 credit; NURS 7505 = 1 credit; NURS 6502 = 3 credits; NURS 6408 = 2 credits

- **CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
- **NURS 5222** - Advanced Human Physiology (2.0 cr)
- **NURS 5226** - Advanced Human Pathophysiology (2.0 cr)
- **NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
- **NURS 5229** - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
- **NURS 6305** - Reproductive and Sexual Health Care (3.0 cr)
- **NURS 6307** - Assessment and Management of Health for APNs Practicum III (1.0 cr)
- **NURS 6407** - Advanced Nursing Care of Older Adults (3.0 cr)
- **NURS 6408** - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
- **NURS 6501** - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- **NURS 6502** - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- **NURS 7202** - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- **NURS 7406** - Advanced Nursing Practicum in Adult-Gerontology Health (2.0 cr)
- **NURS 7502** - Health Care of Older Adults for Adult-Gerontology Nurse Practitioner: Acute and Chronic Management (2.0 cr)
- **NURS 7504** - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
- **NURS 7505** - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)

**Women's Health/Gender-Related Nurse Practitioner**
The DNP program with a specialty in women's health prepares nurses for leadership as advanced practice nurses.
Clinical experience is offered in primary care, women's health, and specialty practice areas, such as oncology and reproductive endocrinology. Students ground their studies in the science of nursing intervention, moral/ethical issues, and nursing research. They then focus on courses that examine the basis of assessment and intervention for adolescent and adult populations with an emphasis on adolescent and adult women. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. A final project that is a systematic investigation of a practice problem is planned, implemented, and completed during the curriculum.

**Required Specialty Coursework**

Complete the following courses for at least 38 credits. Courses with Variable credit requirements for this specialty: NURS 5229 = 3 credits; NURS 6305 = 3 credits; NURS 6925 = 3 credits.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSPH 5101</td>
<td>Introduction to Integrative Healing Practices (3.0 cr)</td>
</tr>
<tr>
<td>NURS 5200</td>
<td>Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)</td>
</tr>
<tr>
<td>NURS 5222</td>
<td>Advanced Human Physiology (2.0 cr)</td>
</tr>
<tr>
<td>NURS 5226</td>
<td>Advanced Human Pathophysiology (2.0 cr)</td>
</tr>
<tr>
<td>NURS 5228</td>
<td>Pharmacology for Advanced Practice Nursing (2.0 cr)</td>
</tr>
<tr>
<td>NURS 5229</td>
<td>Clinical Pharmacotherapeutics (3.0 - 4.0 cr)</td>
</tr>
<tr>
<td>NURS 6213</td>
<td>Reproductive Healthcare for Patients with Complex Conditions (2.0 cr)</td>
</tr>
<tr>
<td>NURS 6214</td>
<td>Reproductive Health Care for Patients with Complex Conditions Practicum (2.0 cr)</td>
</tr>
<tr>
<td>NURS 6305</td>
<td>Reproductive and Sexual Health Care (3.0 cr)</td>
</tr>
<tr>
<td>NURS 6306</td>
<td>Reproductive and Sexual Health Practicum (1.0 cr)</td>
</tr>
<tr>
<td>NURS 6501</td>
<td>Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)</td>
</tr>
<tr>
<td>NURS 6925</td>
<td>Advanced Concepts in Reproductive and Sexual Health Care (2.0 - 3.0 cr)</td>
</tr>
<tr>
<td>NURS 6926</td>
<td>Advanced Concepts in Women's Health for WHNP Practicum I (1.0 cr)</td>
</tr>
<tr>
<td>NURS 6927</td>
<td>Advanced Concepts in Women's Health II (3.0 cr)</td>
</tr>
<tr>
<td>NURS 6929</td>
<td>Adv Concepts in Women's Health II WHNP Prac (1.0 cr)</td>
</tr>
<tr>
<td>NURS 7202</td>
<td>Moral and Ethical Positions and Actions in Nursing (2.0 cr)</td>
</tr>
<tr>
<td>NURS 7310</td>
<td>WHNP Clinical and Professional Integration (2.0 cr)</td>
</tr>
</tbody>
</table>

**Nurse Anesthesia**

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The nurse anesthesia area of study prepares registered nurses to become Certified Registered Nurse Anesthetists (CRNAs) who are prepared for nurse anesthesia practice at the highest level. Graduates will possess expertise in general and regional anesthesia techniques and will be prepared to provide leadership in the practice setting. The nurse anesthesia area of study is fully accredited by the Council on Accreditation of Nurse Anesthesia Education Programs. The program was the first nurse anesthesia program in the US to be accredited to offer the entry-level DNP.

With the Minneapolis VA Medical Center serving as the primary clinical site for the program, the University of Minnesota nurse anesthesia students rotate to several urban and rural clinical sites, which offer a broad spectrum of practice experiences.

Nurse anesthesia students complete the requirements for the DNP degree, as well as the requirements to take the National Certification Exam for nurse anesthetists.

**Required Specialty Coursework**

Complete the following courses for at least 61 credits.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 5220</td>
<td>Pharmacotherapeutics for Nurse Anesthesia I (2.0 cr)</td>
</tr>
<tr>
<td>NURS 5222</td>
<td>Advanced Human Physiology (2.0 cr)</td>
</tr>
<tr>
<td>NURS 5226</td>
<td>Advanced Human Pathophysiology (2.0 cr)</td>
</tr>
<tr>
<td>NURS 5230</td>
<td>Pharmacotherapeutics for Nurse Anesthesia II (4.0 cr)</td>
</tr>
<tr>
<td>NURS 6895</td>
<td>Adult Acute Care Holistic Health Assessment and Wellness (2.0 cr)</td>
</tr>
<tr>
<td>NURS 6900</td>
<td>Introduction to Principles of Anesthesia (4.0 cr)</td>
</tr>
<tr>
<td>NURS 6901</td>
<td>Basic Nurse Anesthesia Principles (3.0 cr)</td>
</tr>
<tr>
<td>NURS 6902</td>
<td>Nurse Anesthesia Care: Cardiothoracic and Vascular Diseases (2.0 cr)</td>
</tr>
<tr>
<td>NURS 6903</td>
<td>Nurse Anesthesia Care: Special Populations Across the Lifespan (2.0 cr)</td>
</tr>
<tr>
<td>NURS 6910</td>
<td>Nurse Anesthesia Clinical Integration (3.0 cr)</td>
</tr>
<tr>
<td>NURS 6911</td>
<td>Basic Nurse Anesthesia Principles Practicum I (2.0 cr)</td>
</tr>
<tr>
<td>NURS 6912</td>
<td>Nurse Anesthesia Care: Cardiothoracic and Vascular Disease Practicum III (3.0 cr)</td>
</tr>
<tr>
<td>NURS 6913</td>
<td>Nurse Anesthesia Care of the Special Population and Across the Lifespan Practicum IV (4.0 cr)</td>
</tr>
<tr>
<td>NURS 6914</td>
<td>Basic Nurse Anesthesia Principles Practicum II (3.0 cr)</td>
</tr>
<tr>
<td>NURS 7004</td>
<td>Advanced Nurse Anesthesia Practicum V (5.0 cr)</td>
</tr>
<tr>
<td>NURS 7005</td>
<td>Advanced Nurse Anesthesia Practicum VI (5.0 cr)</td>
</tr>
<tr>
<td>NURS 7006</td>
<td>Advanced Nurse Anesthesia Practicum VII (5.0 cr)</td>
</tr>
<tr>
<td>NURS 7202</td>
<td>Moral and Ethical Positions and Actions in Nursing (2.0 cr)</td>
</tr>
<tr>
<td>PHSL 5115</td>
<td>Clinical Physiology I (3.0 cr)</td>
</tr>
</tbody>
</table>
Family Nurse Practitioner

The DNP program with a specialty in the family nurse practitioner (FNP) area of study prepares advanced practice nurses for leadership in the provision of health care to individuals and families across the lifespan. The program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and clinical practicums.

The FNP area of study offers an academic-practice program to develop nurse leaders for health promotion and clinical management of health conditions in individuals across the lifespan within the context of their families and environment. Students ground their studies in the science of nursing intervention, evidence-based practice, scientific knowledge, moral/ethical issues, and nursing research. They apply skills focused on evaluating the basis of assessment and intervention for families and individuals of all ages and backgrounds. Faculty and staff within the School of Nursing arrange clinical practicum experiences to provide practice opportunities with diverse populations and settings and to meet the individual needs of students while also meeting national accreditation and certification requirements. In addition to completing core studies in the specialty population, students also gain skills in program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. During the curriculum, students design, implement and complete a final project that is a systematic investigation of a practice.

Required Specialty Coursework

Completion of the courses for 41 credits is required for this specialty. Specialty Credit requirements for courses with variable credits:

NURS 5229 = 4 credits; NURS 6305 = 3 credits; NURS 6502 = 3 credits; NURS 7504 = 1 credit; NURS 7505 = 1 credit

CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
NURS 5222 - Advanced Human Physiology (2.0 cr)
NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
NURS 6102 - Family Health Theory (2.0 cr)
NURS 6305 - Reproductive and Sexual Health Care (3.0 cr)
NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
NURS 7501 - Health Care of Children for the Family Nurse Practitioner Practicum (1.0 cr)
NURS 7503 - Reproductive Health Care of Women Practicum for Family Nurse Practitioners (1.0 cr)
NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
NURS 7506 - Family Practice Practicum III: Assessment and Management of Health for the Family Nurse Practitioner (1.0 cr)
NURS 7507 - Assessment and Management of Health Practicum IV: Health Leadership for Family Nurse Practitioners (1.0 cr)
NURS 7508 - Health Care of the Elderly for the Family Nurse Practitioner Practicum (1.0 cr)
NURS 7509 - Assessment and Management of Health Practicum VI: Primary Care for the Family Nurse Practitioner (1.0 cr)
NURS 7515 - Health Care of Children for the Family Nurse Practitioner: Well Child Care (1.0 cr)
NURS 7516 - Health Care of Children for the Family Nurse Practitioner: Acute and Chronic Management (2.0 cr)
NURS 7518 - Health Care of the Elder Patient for the Family Nurse Practitioner (1.0 cr)

Health Innovation and Leadership

Health care is delivered today in diverse settings, by an expanding workforce and with extraordinary opportunities for nurses to lead, whether through formal leadership positions or through personal advocacy, in traditional settings, or in emerging sites. This requires an individual who can think broadly and embrace a global perspective; who embraces diversity in all its forms, including diversity of thought; who is curious and never satisfied with the status quo; who stimulates new ways of thinking and solutions which open up possibilities for action; who bases action on informed practice gained from multiple ways of knowing; who engages in critical thinking, and learns from other thought leaders; who inspires and creates needed change within a particular environment; who can work effectively with a variety of individuals and within disparate groups; and who can create healing environments within which others can do their best work.

The DNP, with a focus on health innovation and leadership, prepares nurses to function effectively as leaders in traditional and contemporary settings. The goal is to prepare a leader who can work well in the current environment while promoting change and improvement. Students in the program utilize a combination of learning strategies, readings, reflections, and independent learning experiences. Seminars will enable students and faculty to discuss relevant issues and share expertise.

Students must complete the required specialty courses for 34 credits and at least 5 credits of electives to achieve 39 graduate level credits to complete the specialty. Credit requirements for this specialty for courses with variable credits: NURS 6704 = 1 credit; NURS 6706 = 2 credits; NURS 7605 = 2 credits. Students choose 5 credits of elective graduate level coursework in consultation with their faculty advisor.

Required Coursework

Completion of the following courses for at least 39 credits.

CSPH 5711 - Optimal Healing Environments (3.0 cr)
HUMF 5874 - Human Centered Design to Improve Complex Systems (4.0 cr)
NURS 6600 - Health Systems and Care Models (3.0 cr)
NURS 6702 - Nursing Leadership Seminar: Introduction to Innovation and Leadership (3.0 cr)
NURS 6703 - Nursing Leadership Seminar: Organizational Culture and Leadership (2.0 cr)
NURS 6704 - Nursing Leadership Practicum: Organizational Culture and Leadership (1.0 - 2.0 cr)
NURS 6706 - Nursing Leadership Practicum: Quality and Change Management (1.0 - 2.0 cr)
NURS 6707 - Health Care Design and Innovation Practicum (2.0 cr)
NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
NURS 7604 - Executive Leadership Seminar: Boundary Spanning Leadership (2.0 cr)
NURS 7605 - Executive Leadership Practicum: Boundary Spanning Leadership (1.0 - 2.0 cr)
NURS 7606 - Relationship-Based Leadership and Management (3.0 cr)
NURS 7608 - Health Care Finance and Resource Management (3.0 cr)

Specialty Electives
Choose 5 credits of elective coursework in collaboration with faculty advisor. Additional selections permitted with approval from the faculty advisor.
Take 5 or more credit(s) from the following:
- CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
- NURS 5812 - Global Health Through Study Abroad (1.0 - 2.0 cr)
- GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
- CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6100 - Topics: Environmental Health (1.0 - 4.0 cr)

Nursing Informatics
The nursing informatics (NI) specialty area prepares graduates with knowledge and skills necessary for leadership roles in health and nursing informatics to address the issues for consumers, clinical providers, and public health for processing and managing information through the use of various technologies. A wide array of courses throughout the University of Minnesota accompany nursing offerings, which offers students the opportunity to strengthen their disciplinary and interdisciplinary expertise.

With increasing demand for computerizing health information, graduates of the nursing informatics specialty are well positioned to assume leadership roles in nursing and health informatics field. The NI area of study provides knowledge and scholarship complemented by clinical experiences in the following areas:

- Systems analysis and design
- Knowledge representation and interoperability
- Clinical decision support and evidence-based practice
- Human factors and usability
- Leadership and health informatics
- Consumer, clinical provider, and population health informatics
- Health policy leadership
- Development and project management of health informatics projects
- Program evaluation
- Organization and administration of health services
- Ethical foundations of nursing
- Applied research

Required Specialty Coursework
Complete the following courses and at least 28 credits:
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- NURS 5611 - Database Principles for Healthcare (2.0 cr)
- NURS 6105 - Systems Analysis and Design (3.0 cr)
- NURS 7051 - Data Science for Healthcare (2.0 cr)
- NURS 7052 - Data Science for Healthcare Practicum (1.0 cr)
- NURS 7105 - Knowledge Representation and Interoperability (2.0 cr)
- NURS 7106 - Knowledge Representation and Interoperability Practicum (2.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)
- NURS 7109 - Population Health Informatics Practicum (2.0 cr)
- NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
- NURS 7114 - Clinical Decision Support Practicum (2.0 cr)
- NURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
Integrative Health and Healing
The integrative health and healing specialty area prepares graduates with skills necessary for working with individuals, families, communities, and health systems in developing holistic approaches to health promotion, disease prevention, and chronic disease management, with a special emphasis on managing lifestyle changes and incorporating the use of complementary therapies. Graduates are prepared to work in diverse settings including hospitals, outpatient settings, health plans, corporate and community organizations, and in private practice. A wide array of courses are available which offer students the opportunity to strengthen their disciplinary and interdisciplinary expertise. Through a collaboration with the Center for Spirituality and Healing, students can opt to concurrently earn a graduate certificate in integrative therapies and healing practices, including a focus in health coaching.

The integrative health and healing area of study provides a foundation of knowledge and practical experiences in the following areas:
- Optimal healing environments
- Botanical medicine
- Clinical aromatherapy
- Mind/body healing
- Functional nutrition
- Energy healing
- Health coaching
- Self-care
- Advanced integrative health and healing skills and program planning
- Applied research

Students choosing to complete coursework part-time are well accommodated by the curriculum.

Completion of 40 graduate level credits is required for the specialty - 38 credits of required coursework and 2 credits of elective coursework.

Required Specialty Coursework
Complete the following courses for at least 39 credits.
- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
- CSPH 5313 - Acupressure (1.0 cr)
- CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
- CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
- CSPH 5535 - Reiki Healing (1.0 cr)
- CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
- CSPH 5631 - Healing Imagery I (2.0 cr)
- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7209 - Integrative Nursing I (1.0 cr)
- NURS 7210 - Integrative Nursing Practicum I (1.0 cr)
- NURS 7211 - Integrative Nursing Didactic II (1.0 cr)
- NURS 7212 - Integrative Nursing Practicum II (2.0 cr)
- NURS 7214 - Integrative Health and Healing III (1.0 cr)
- NURS 7215 - Integrative Health and Healing Practicum III (2.0 cr)

Complete one of the following course options
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- or CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)

Specialty Electives
Additional course may be available with faculty advisor approval.
Take 2 or more credit(s) from the following:
- CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5121 - Planetary Health & Global Climate Change: A Whole Systems Healing Approach (2.0 cr)
- CSPH 5201 - Spirituality and Resilience (2.0 cr)
- CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- CSPH 5225 - Meditation: Integrating Body and Mind (2.0 cr)
- CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
Students who pursue the pediatric clinical nurse specialist (PCNS) specialty area take core courses in nursing theory, moral/ethical issues, and research. They acquire skills in health assessment, intervention, and evaluation. They examine the care of children and families with special health care needs. They focus on planning and implementing programs to improve quality of care for children with chronic and complex illnesses. As the population of children with special health care needs continues to increase, there is likely to be a greater demand for clinical experts and leaders in pediatric nursing. The PCNS area of study is supported by the Center for Children with Special Health Care Needs.

**Required Specialty Coursework**

Complete the following courses for at least 42 credits.

- **NURS 5200** - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- **NURS 5222** - Advanced Human Physiology (2.0 cr)
- **NURS 5226** - Advanced Human Pathophysiology (2.0 cr)
- **NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
- **NURS 5229** - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
- **NURS 6210** - Midwifery Care of the Childbearing Family (3.0 cr)
- **NURS 6211** - Midwifery Care of the Childbearing Family Practicum (2.0 cr)
- **NURS 6213** - Reproductive Healthcare for Patients with Complex Conditions (2.0 cr)
- **NURS 6214** - Reproductive Health Care for Patients with Complex Conditions Practicum (2.0 cr)
- **NURS 6302** - Racism and Health Disparity Prevention for Midwives (1.0 cr)
- **NURS 6305** - Reproductive and Sexual Health Care (3.0 cr)
- **NURS 6306** - Reproductive and Sexual Health Practicum (1.0 cr)
- **NURS 6308** - Women’s Primary Care Practicum (1.0 - 2.0 cr)
- **NURS 6501** - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- **NURS 6925** - Advanced Concepts in Reproductive and Sexual Health Care (2.0 - 3.0 cr)
- **NURS 7202** - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- **NURS 7213** - Midwifery Clinical and Professional Integration (3.0 cr)

**Labor and Delivery Experience**

Students are required to complete NURS 5505 if they do not have labor and delivery experience as Registered Nurse. NURS 5505 = 3 credits; NURS 6925 = 3 credits; NURS 6305 = 2 credits

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Information current as of November 07, 2022
PCNS coursework includes supervised clinical experiences. Efforts are made to provide students with clinical settings within their geographical area. Clinical courses are directed by certified faculty and supervised by clinical nurse specialist preceptors. The PCNS area of study can be completed in a two-year (full-time) or three-year (part-time) sequence.

PCNSs work in collaboration with health care teams in a variety of settings to facilitate quality care for children across the continuum of care settings. They function as clinical experts in the planning, implementation, and evaluation of patient care standards. They provide direct care, oversee staff, patient and family education, participate in clinical research, and develop programs specific to the needs of children.

Required Specialty Coursework
Completion of the courses for 40 credits. Specialty credit requirements for courses with variable credits: NURs 5229 = 3 credits; NURS 6921 = 1 credit

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 6405 - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- NURS 6406 - Advanced Practice CNS Roles Across the Lifespan: Practicum (1.0 cr)
- NURS 6519 - Advanced Pediatric Assessment (1.0 cr)
- NURS 6920 - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
- NURS 6921 - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 6929 - Advanced Nursing Care of Children with Acute Illness: Practicum for PCNS (2.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7925 - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
- NURS 7926 - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 7927 - [Inactive] (1.0 cr)
- OLPD 5356 - Disability Policy and Services (3.0 cr)

Pediatric Nurse Practitioner - Primary Care
The pediatric nurse practitioner (PNP) area of study incorporates theory and clinical courses to prepare students to provide comprehensive care to children and their families. Most students elect to complete the children with special health care needs (CSHCN) leadership track by taking additional courses which are supported by the Center for Children with Special Health Care Needs.

Coursework includes nursing theory, moral/ethical issues, research, child assessment, management of childhood illnesses, and health policy. Courses are taught by faculty from the School of Nursing, School of Public Health, the Institute of Child Development, Family Social Science, the Medical School, and the Institute of Community Integration in the College of Education.

Supervised clinical experience is incorporated in the program. Efforts are made to meet students’ individual goals and to provide experiences in their geographic area. Clinical experiences are available in interdisciplinary settings such as primary care, home care, schools, specialty clinics, community agencies, the legislature, and the Minnesota Department of Health.

At the completion of the program, students are eligible to take the Pediatric Nurse Practitioner certification examinations offered by the American Nurses Credentialing Center or the National Certification Board of Pediatric Nurse Practitioners and Nurses. Students in the CSHCN track are eligible for certification from the Institute on Community Integration.

Required Specialty Coursework
Completion of the following courses for at least 40 credits is required. Specialty credit requirements for variable credit courses: NURS 5229 = 3 credits; NURS 6921 = 2 credits

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 6519 - Advanced Pediatric Assessment (1.0 cr)
- NURS 6920 - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
- NURS 6921 - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6922 - Primary Care: Assessment and Management of Common Conditions Affecting Children (3.0 cr)
- NURS 6923 - Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children (2.0 cr)
- NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
Psychiatric-Mental Health Nurse Practitioner

Graduate studies in psychiatric-mental health nursing prepare nurses to assume clinical nurse specialist roles with an emphasis on providing direct patient care to persons with major mental disorders and their families. Coursework focuses on the development of advanced practice nursing knowledge and skills required to provide both psychotherapeutic and biological interventions for the management of acute and chronic psychiatric symptoms with a variety of patients in diverse settings. Coursework integrates extant theories and research in the study of advanced health assessment, psychopathology assessment, psychopharmacology, and individual family and group therapy within various community and institutional systems.

Clinical emphasis is on secondary and tertiary psychiatric interventions and outcomes within a managed care context. Students are clinically precepted by certified psychiatric-mental health clinical nurse specialists. Clinical experiences are available in outpatient clinics, community mental health centers, hospitals, schools, and home care agencies. Full-time or part-time students may enroll in the area of study. Current psychiatric nursing experience is strongly encouraged.

Graduates will be academically prepared to take the American Nurses Credentialing Center (ANCC) certification examination for certified specialists in psychiatric-mental health nursing, after obtaining additional required post-master's clinical hours and supervision.

Completion of 42 credits is required for the specialty - 39 credits of required specialty coursework and 3 credits of complementary alternative medicine elective coursework.

**Required Specialty Coursework**

Completion of the following courses for at least 39 credits. Specialty requirements for courses with variable credits: NURS 5229 = 3 credits

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5225 - Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing (3.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 6504 - Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing (2.0 cr)
- NURS 6505 - PMH/APN Prac II:Assessing, Managing Psychiatric Disorders in Adv Prac Psychiatric-Mental Health Nurs (2.0 cr)
- NURS 6602 - PMH Advanced Practice Nursing: Group as a Health Care Intervention (2.0 cr)
- NURS 6603 - PMH APN Practicum IV: Group as a Health Care Intervention (2.0 cr)
- NURS 6604 - Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing (2.0 cr)
- NURS 6605 - Psychiatric/Mental Health Advanced Nursing Practice Practicum I (1.0 cr)
- NURS 6802 - Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families (2.0 cr)
- NURS 6803 - Psychiatric/Mental Health Adv Prac Nurs Practicum III: Psychotherapy With Individuals,Families (1.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7612 - Psychiatric/Mental Health Advanced Practice Nursing: Professional Seminar (1.0 cr)
- NURS 7613 - Psychiatric/Mental Health Advanced Practice Nursing: Practicum V (2.0 cr)

**Complimentary Alternative Medicine Electives**

Elective coursework is required and chosen in consultation with faculty advisors. Additional options may be permitted with faculty advisor approval.

Take 3 or more credit(s) from the following:

- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5313 - Acupressure (1.0 cr)
- CSPH 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)
- CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
- CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
- CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
- CSPH 5535 - Reiki Healing (1.0 cr)
- CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
- CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
- CSPH 5631 - Healing Imagery I (2.0 cr)
Post-Master's D.N.P.

The post-master's option is for individuals who already hold a master's degree in a nursing practice specialty and who have nursing specialty preparation. The DNP program prepares nurses for leadership as advanced practice nurses, clinical experts, health care executives, policy experts, and informaticians.

Post-master's DNP students complete the core DNP requirements and any additional coursework needed to achieve the 1000 hour practicum requirement. Consult with the DNP program for more information.

Preceptor Supervisor Practicum Hours

Students completing the Post-Master's DNP must complete 1000 supervised hours of practicum. Upon admission, the total hours completed through the master's degree is documented and a gap analysis identifies whether additional practicum hours are needed. The number of credits of appropriate systems-level practicum coursework necessary to meet the 1000-hour requirement, if any, will be determined in consultation with the faculty advisor.

Practicum Course Options

Courses are chosen in consultation with the faculty advisor. Additional options are permitted with advisor approval.

Take 0 or more credit(s) from the following:

- NURS 5117 - Consumer Health Informatics Practicum (2.0 cr)
- NURS 6704 - Nursing Leadership Practicum: Organizational Culture and Leadership (1.0 - 2.0 cr)
- NURS 6706 - Nursing Leadership Practicum: Quality and Change Management (1.0 - 2.0 cr)
- NURS 7106 - Knowledge Representation and Interoperability Practicum (2.0 cr)
- NURS 7109 - Population Health Informatics Practicum (2.0 cr)
- NURS 7401 - Health Policy Leadership Practicum (0.5 - 1.0 cr)
- NURS 7605 - Executive Leadership Practicum: Boundary Spanning Leadership (1.0 - 2.0 cr)
- NURS 7904 - Nursing Education Practicum (2.0 cr)
- NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
- NURS 5812 - Global Health Through Study Abroad (1.0 - 2.0 cr)
Twin Cities Campus
Integrative Health and Wellbeing Coaching M.A.
Spirituality & Healing, Center for
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Earl E. Bakken Center for Spirituality & Healing C591 Mayo Memorial Building 420 Delaware St SE Minneapolis, MN 55455
Email: csh-academics@umn.edu
Website: https://www.csh.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 38
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health coaching is an emerging method of partnering with clients to help them achieve their overall goals. Integrative health coaches practice from a holistic perspective that views the client as intrinsically healthy, whole, wise, and the ultimate expert in their own healing journey. Although health coaches do not diagnose or treat illness, they assist those with health conditions to enhance their healing and change their lifestyle patterns. While an individual may make some changes alone, many changes happen more easily within the structure and support of a partnership, which can be uniquely provided by a health coach. This assistance includes necessary connection to resources, and the assembly of an optimal, interprofessional healthcare team. The ability to perform this role requires that health coaches have a comfortable working knowledge in both conventional and integrative healthcare.

The Earl E. Bakken Center for Spirituality & Healing is a pioneer in the health coaching field, working to advance education, research, and care model innovation. The Master of Arts in Integrative Health and Wellbeing Coaching was the first masters level health coaching degree to be offered through an accredited university in the United States. Graduates of the program work in a multitude of practice settings, including hospitals, clinics, health educational facilities, community centers, senior living centers, fitness venues, corporations, schools, and private practice.

All required coursework is offered in a blended format that combines online curriculum with in person intensives. Students are required to be on campus two extended weekends per semester. The program requires a set of core coaching classes, with additional coursework in integrative nutrition, mind-body science, physical exercise, lifestyle medicine, coaching for chronic conditions, and group health coaching. Six credits of elective courses round out the degree, which gives students the opportunity to take other CSPH courses or to satisfy requirements for a minor in another department. Students finish the program with a 2-credit capstone project.

The Bakken Center for Spirituality & Healing's integrative health coaching programs are accredited by the National Board for Health and Wellness Coaching (NBHWC) (https://nbhwc.org). The Bakken Center has been a national leader in defining the scope of practice, developing educational competencies and standard of practice, and helping to lead the creation of a national certification process and exam in Health and Wellness coaching. Students in the Master of Arts program are eligible to take the national board certification exam after the required core courses are completed (CSPH 5701-5702-5703-5705-5706). In addition, nurses may complete a certification exam as Health and Wellness Nurse Coaches (http://www.ahncc.org/).

Although the instruction is based on research in the field, this Plan B degree is not intended to provide intensive research training and is understood to be a terminal degree.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree in a health-related field or a bachelor's degree in a non-health-related field with specific coursework in psychology, physiology, and statistics from an accredited institution.

Required prerequisites
Required Prerequisites Coursework

Previous coursework in basic psychology, human physiology, and statistics must have been completed. Statistics must be completed within 7 years prior to application. All prerequisites must be completed at an accredited institution for a grade equal to B (3.0) or better.

Other requirements to be completed before admission:
In addition to the University's online application, applicants submit a personal statement describing their goals for the program and their professional qualifications. This three to five page statement should focus on what led to the applicant's interest in health coaching as a professional activity, including a description of interest in, and experience with, holistic integrative health and healing. Three letters of recommendation, transcripts, and a current CV or resume are also required. All items are uploaded into the University's online application. Selected applicants will be invited for admissions interviews.

Special Application Requirements:
The degree is designed for individuals with a bachelor's degree in a health-related field, or for professionals without healthcare backgrounds who have extensive interest in working with individuals and groups to optimize wellbeing, assuming completion of required prerequisites. All applicants must have completed the prerequisite courses in Physiology, Statistics (within past 7 years), and Psychology before beginning core health coaching coursework the Fall semester of entrance. All prerequisite courses must be completed at an accredited institution with a grade equal to B (3.0) or better.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 32 to 38 major credits and 0 to 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The capstone is the culminating course for the Master of Arts in Integrative Health and Wellbeing Coaching program. Students use coaching data collected during the Advanced Health Coaching Practicum, Health Coaching Professional Internship, or Group Health Coaching course to write and orally present a research-informed concept analysis and retrospective narrative case report. Prerequisites: Integrative Health and Wellbeing Coaching Master of Arts student, CSPH 5701, 5702, 5703, 5704, 5705, 5706, 5707, 5709* (*may be taken concurrently).

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Up to 3 credits of CSPH courses at the 4xxx-level may be used for elective credits.

Core Required Coursework (23 credits)
Core courses require a grade of B (3.0) or higher, except CSPH 5705 and 8701, which require a grade of S. Final skills assessments for CSPH 5702, 5703, 5705, and 5709 must earn scores of at least 80%. If a core course or skills assessment is not successfully completed, students may be required at instructors' discretion to repeat the course and/or take CSPH 5712 for 1 credit for remediation within one calendar year. CSPH 5712 taken for remediation cannot be counted as an elective.

CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)  
CSPH 5704 - Business of Health Coaching (2.0 cr)  
CSPH 5705 - Health Coaching Professional Internship (2.0 cr)  
CSPH 5706 - Lifestyle Medicine (2.0 cr)  
CSPH 5707 - Coaching People with Clinical Conditions (2.0 cr)  
CSPH 5708 - Health and Wellbeing Group Coaching (2.0 cr)  
CSPH 8701 - Integrative Health and Wellbeing Coaching MA Capstone Project (2.0 cr)  

**Additional Required Coursework (9 credits)**  
Each additional required course must be taken on an A-F grading basis and requires a grade of B- or higher. Failure to earn at least a B- may result in required remediation work at the discretion of the instructor, the program director, and the director of graduate studies. Remediation work may include repeating the course for an acceptable grade within one calendar year.  
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)  
CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)  
CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)  
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)  

**Electives (6 credits)**  
Complete 6 CSPH credits. Up to 3 credits may be from 4xxx-level CSPH courses. Electives require a passing grade of C- or higher or S, provided an overall GPA of 3.0 is maintained.  
Take 6 or more credit(s) from the following:  
- CSPH 4311 - Foundations of Hatha Yoga: Alignment & Movement Principles (3.0 cr)  
- CSPH 4312 - Hatha Yoga Philosophy, Lifestyle, & Ethics (3.0 cr)  
- CSPH 4313 - Hatha Yoga Teaching Principles & Methodology (2.0 cr)  
- CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)  
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)  
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)  
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)  
- CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)  
- CSPH 5121 - Planetary Health & Global Climate Change: A Whole Systems Healing Approach (2.0 cr)  
- CSPH 5201 - Spirituality and Resilience (2.0 cr)  
- CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)  
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)  
- CSPH 5225 - Meditation: Integrating Body and Mind (2.0 cr)  
- CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)  
- CSPH 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)  
- CSPH 5305 - Introduction to Integrative Mental Health (2.0 cr)  
- CSPH 5307 - Integrative Nursing: Application across Settings and Populations (1.0 cr)  
- CSPH 5313 - Acupressure (1.0 cr)  
- CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)  
- CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)  
- CSPH 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)  
- CSPH 5319 - Yoga and Ayurveda in India (4.0 cr)  
- CSPH 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)  
- CSPH 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)  
- CSPH 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)  
- CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)  
- CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)  
- CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)  
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)  
- CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)  
- CSPH 5521 - Therapeutic Landscapes (3.0 cr)  
- CSPH 5522 - Therapeutic Horticulture (3.0 cr)  
- CSPH 5535 - Reiki Healing (1.0 cr)  
- CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)  
- CSPH 5541 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)  
- CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)  
- CSPH 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)  
- CSPH 5601 - Music, Health and Healing (2.0 cr)  
- CSPH 5631 - Healing Imagery I (2.0 cr)  
- CSPH 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)  
- CSPH 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)  
- CSPH 5643 - Horse as Teacher: Introduction to Equine-Assisted Services (EAS) (3.0 cr)  
- CSPH 5711 - Optimal Healing Environments (3.0 cr)  
- CSPH 5712 - Supervised Health Coaching Skills Advancement (1.0 cr)  
- CSPH 5713 - Health Coaching for Health Professionals (2.0 cr)
• CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
• CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
• CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
• CSPH 5905 - Food Matters: Cook Like Your Life Depends On It (1.0 cr)
• CSPH 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)
Twin Cities Campus
Integrative Therapies & Healing Practices Minor
Spirituality & Healing, Center for
School of Nursing

Contact Information:
Earl E. Bakken Center for Spirituality & Healing, Mayo Memorial Building, Room C591, MMC 505, 420 Delaware Street SE, Minneapolis, MN 55455 (612-624-9459; fax: 612-626-5280)
Email: csh-academics@umn.edu
Website: https://www.csh.umn.edu/

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Integrative Therapies and Healing Practices director of graduate studies regarding feasibility and requirements.
Note that students may not use course credits to satisfy requirements for both a major and the minor.

**Required Course**
All students complete the Introduction to Integrative Therapies and Healing Practices course.
Take 1 or more course(s) totaling 3 or more credit(s) from the following:
- CSPA 5010 - Introduction to Integrative Healing Practices (3.0 cr)

**Elective Options**
AMaster's students complete at least 5 credits and doctoral students complete at least 9 credits to complete the minor.
- CSPA 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
  or CSPA 5102 - Art of Healing: Self as Healer (1.0 cr)
  or CSPA 5111 - Ways of Thinking about Health (2.0 cr)
  or CSPA 5112 - Cultural Awareness, Knowledge and Health (3.0 cr)
  or CSPA 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
  or CSPA 5211 - Planetary Health & Global Climate Change: A Whole Systems Healing Approach (2.0 cr)
  or CSPA 5201 - Spirituality and Resilience (2.0 cr)
  or CSPA 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
  or CSPA 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
  or CSPA 5225 - Meditation: Integrating Body and Mind (2.0 cr)
  or CSPA 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
  or CSPA 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)
  or CSPA 5305 - Introduction to Integrative Mental Health (2.0 cr)
  or CSPA 5307 - Integrative Nursing: Application across Settings and Populations (1.0 cr)
  or CSPA 5313 - Acupressure (1.0 cr)
  or CSPA 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
  or CSPA 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
  or CSPA 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)
  or CSPA 5319 - Yoga and Ayurveda in India (4.0 cr)
  or CSPA 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)
  or CSPA 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)
  or CSPA 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)
  or CSPA 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
  or CSPA 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
  or CSPA 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
  or CSPA 5503 - Aromatherapy Fundamentals (1.0 cr)
  or CSPA 5521 - Therapeutic Landscapes (3.0 cr)
  or CSPA 5522 - Therapeutic Horticulture (3.0 cr)
  or CSPA 5535 - Reiki Healing (1.0 cr)
  or CSPA 5536 - Advanced Reiki Healing: Level II (1.0 cr)
  or CSPA 5541 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)
  or CSPA 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
  or CSPA 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)
  or CSPA 5560 - Music, Health and Healing (2.0 cr)
  or CSPA 5631 - Healing Imagery I (2.0 cr)
  or CSPA 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)
  or CSPA 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)
  or CSPA 5643 - Horse as Teacher: Introduction to Equine-Assisted Services (EAS) (3.0 cr)
  or CSPA 5701 - Fundamentals of Health Coaching I (4.0 cr)
  or CSPA 5706 - Lifestyle Medicine (2.0 cr)
  or CSPA 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
  or CSPA 5711 - Optimal Healing Environments (3.0 cr)
  or CSPA 5712 - Supervised Health Coaching Skills Advancement (1.0 cr)
  or CSPA 5713 - Health Coaching for Health Professionals (2.0 cr)
  or CSPA 5805 - Wellbeing in the Workplace (3.0 cr)
  or CSPA 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
  or CSPA 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
  or CSPA 5905 - Food Matters: Cook Like Your Life Depends On It (1.0 cr)
  or CSPA 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)

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Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

MASTERS

DOCTORAL
Twin Cities Campus
Integrative Therapies & Healing Practices Postbaccalaureate Certificate

Spirituality & Healing, Center for
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Earl E. Bakken Center for Spirituality & Healing, Mayo Memorial Building, Room CS91, MMC 505, 420 Delaware Street SE, Minneapolis, MN 55455 (612-624-9459; fax: 612-626-5280). Email: csh-academics@umn.edu
Website: https://www.csh.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12 to 20
- This program does not require summer semesters for timely completion.
- Degree: Integrative Therapies and Healing Prac PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Postbaccalaureate Certificate in Integrative Therapies and Healing Practices is an innovative, interdisciplinary program designed to expose students to a global range of integrative, complementary, cross-cultural, and spiritual healing practices. The program enables students to acquire advanced knowledge and skills to enhance their professional careers, their own lives, and the lives of their patients. Courses augment the preparation of students in health sciences and related disciplines, by developing knowledge and skills in the emerging field of integrative healthcare. Specifically, the certificate provides students with a theoretical basis for applying integrative therapies and healing practices; prepares students to evaluate research in integrative therapies and healing practices; and prepares students to work collaboratively with other health professionals and patients in a multicultural, pluralistic healthcare system.

The curriculum for the 12-credit certificate includes a core introductory course that provides the theoretical foundation for the program and a course in self-care. Students choose additional courses in clinical applications, spirituality, or cross-cultural health and healing. Students are encouraged to choose these elective credits from courses consistent with their academic training and professional goals. A faculty advisor will work with the student in designing a program plan that accommodates each student’s unique learning objectives. The program draws upon the rich expertise of University and community-based faculty who encourage and challenge students to discover new ways of caregiving, and to cultivate diverse skills that will transform their life’s work, experiences, and relationships with others.

The certificate may be completed concurrently with another graduate program or completed independently.

Students have the option to pursue a 20-credit Health Coaching track within the certificate. See the Program Sub-Plan section that follows for more information.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The certificate requires applicants to have a bachelor’s or higher degree in a healthcare or related field; or board certified chaplains and other backgrounds with work experience in healthcare.

Eligible degrees include medicine, nursing, psychology, nutrition, Traditional Chinese Medicine, chiropractic medicine, naturopathic medicine, pharmacy, social work, and public health.

Other requirements to be completed before admission:
This field of study is designed for the healthcare professional, those currently enrolled in a graduate health professions program, board-
certified chaplains with at least three years in a healthcare setting, and those with a non-healthcare bachelor's degree with direct work experience in health related areas.

The certificate’s Health Coaching track requires an applicant interview prior to admission.

**Special Application Requirements:**
In addition to the University's online application, applicants submit a personal statement describing their goals for obtaining the certificate and their professional qualifications. The statement should address your interest in integrative therapies and short- and long-term professional goals after completing the program. Two letters of recommendation are required, preferably one from an academic source and one from an employer/supervisor. A current C.V. or resume is also required. All items are uploaded directly into the University's online application.

Applicants to the Health Coaching track are required to provide three letters of recommendation and a three-to-five page personal statement focusing on what led to the applicant's interest in Health Coaching as a professional activity, including a description of interest in and experience with holistic integrative health and healing. A current C.V. or resume is also required. All items are uploaded directly into the University's online application. Selected Health Coaching track applicants will be chosen for admissions interviews.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Course (3 credits)**
Students pursuing either the general certificate or the certificate with health coaching track must complete this course.

*CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)*

**Certificate Options**
General certificate students (non-Health Coaching track) are required to take CSPH 5102 or 5806, and 8 or more additional credits from the General Certificate list. A maximum of 3 credits of the CSPH 4311/4312/4313 level courses may be counted. Coursework for the certificate with the Health Coaching track is detailed in the sub-plan requirements.

**General Certificate (9 credits)**
Additional required and elective courses for students pursuing the general certificate (non-Health Coaching track).

General certificate students complete one of the two following courses for at least one credit:
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)

or

**Electives (8 credits)**
Students are encouraged to choose electives, in consultation with their faculty advisor, from CSPH courses consistent with their academic training and professional goals. Up to 3 credits of CSPH courses at the 4xxx-level may be applied to the certificate.

Take 3 or more course(s) totaling 8 or more credit(s) from the following:

- **CSPH 4311** - Foundations of Hatha Yoga: Alignment & Movement Principles (3.0 cr)
- **CSPH 4312** - Hatha Yoga Philosophy, Lifestyle, & Ethics (3.0 cr)
- **CSPH 4313** - Hatha Yoga Teaching Principles & Methodology (2.0 cr)
• CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
• CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
• CSPH 5111 - Ways of Thinking about Health (2.0 cr)
• CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
• CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
• CSPH 5121 - Planetary Health & Global Climate Change: A Whole Systems Healing Approach (2.0 cr)
• CSPH 5201 - Spirituality and Resilience (2.0 cr)
• CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
• CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
• CSPH 5221 - Spirituality and Resilience (2.0 cr)
• CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
• CSPH 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)
• CSPH 5305 - Introduction to Integrative Mental Health (2.0 cr)
• CSPH 5307 - Integrative Nursing: Application across Settings and Populations (1.0 cr)
• CSPH 5313 - Acupressure (1.0 cr)
• CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
• CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
• CSPH 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)
• CSPH 5319 - Yoga and Ayurveda in India (4.0 cr)
• CSPH 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)
• CSPH 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)
• CSPH 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)
• CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
• CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
• CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
• CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
• CSPH 5505 - Therapeutic Landscapes (3.0 cr)
• CSPH 5522 - Therapeutic Horticulture (3.0 cr)
• CSPH 5535 - Reiki Healing (1.0 cr)
• CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
• CSPH 5541 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)
• CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
• CSPH 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)
• CSPH 5601 - Music, Health and Healing (2.0 cr)
• CSPH 5631 - Healing Imagery I (2.0 cr)
• CSPH 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)
• CSPH 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)
• CSPH 5643 - Horse as Teacher: Introduction to Equine-Assisted Services (EAS) (3.0 cr)
• CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
• CSPH 5706 - Lifestyle Medicine (2.0 cr)
• CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
• CSPH 5711 - Optimal Healing Environments (3.0 cr)
• CSPH 5712 - Supervised Health Coaching Skills Advancement (1.0 cr)
• CSPH 5713 - Health Coaching for Health Professionals (2.0 cr)
• CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
• CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
• CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
• CSPH 5905 - Food Matters: Cook Like Your Life Depends On It (1.0 cr)
• CSPH 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)

-OR-

Health Coaching track
Coursework for the certificate with the health coaching track is detailed in sub-plan requirements.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Integrative Health Coaching
Health coaching is an emerging method of partnering with clients to help them achieve their overall goals. Integrative health coaches practice from a holistic perspective that views the client as intrinsically healthy, whole, wise, and the ultimate expert in their own healing journey. Although health coaches do not diagnose or treat illness, they assist those with health conditions to enhance their healing and change their lifestyle patterns. This assistance includes necessary connection to resources, and the assembly of an optimal,
The Bakken Center for Spirituality & Healing is a pioneer in the health coaching field, working to advance education, research, and care model innovation. Their integrative health coaching programs are accredited by the National Board for Health and Wellness Coaching (NBHWC) (https://nbhwc.org). The Bakken Center has been a national leader in defining the scope of practice, developing educational competencies and standard of practice, and helping to lead the creation of a national certification process and exam in Health and Wellness coaching. Students in the Health Coaching track are eligible to take the national board certification exam after completing the required coursework. Nurses may also complete a certification as Health and Wellness Nurse Coaches (http://www.ahncc.org/).

In addition to the required CSPH 5101 introduction course, students complete the health coaching track course requirements for a minimum of 20 credits. Students are strongly encouraged to confer with their faculty advisor concerning the specific sequence in which the track coursework must be taken. Courses require a grade of B (3.00) or higher except for CSPH 5705, which is S/N only.

Coursework may be completed in a minimum of four semesters or may be spread over a variable amount of time up to a maximum of four years. The curriculum provides education in the coaching process, the therapeutic alliance, and successful interprofessional communication. Students finish the program with a professional internship experience.

**Health Coaching track requirements (17 credits)**

Final skills assessments for CSPH 5702, 5703, and 5705 must earn scores of at least 80%. If a core course or skills assessment is not successfully completed, students may be required at instructors’ discretion to repeat the course and/or take CSPH 5712 for 1 credit for remediation.

- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
- CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
- CSPH 5704 - Business of Health Coaching (2.0 cr)
- CSPH 5705 - Health Coaching Professional Internship (2.0 cr)
- CSPH 5706 - Lifestyle Medicine (2.0 cr)
Leadership in Health Information Technology for Health Professionals
Postbaccalaureate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 16
- This program requires summer semesters for timely completion.
- Degree: Ldrshp in Hlth Info Tec for Hlth Pro PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By combining formal clinical or public health advanced preparation with course work in health information technology (HIT), individuals who earn the postbaccalaureate certificate in leadership in health information technology for health professionals will be able to lead the successful deployment and use of HIT to achieve transformational improvement in the quality, safety, outcomes, and thus in the value of health services.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the program requires a baccalaureate degree from an accredited institution in a clinical or public health discipline. Example degrees would be a BS/BA in nursing or public health.

Preferred: Advanced degree in clinical or public health discipline from an accredited institution (nursing MS/DNP/PhD; public health MPH/MS/PhD; MS/PhD in other health-related field)

Other requirements to be completed before admission:
Applicants must have clinical or public health experience. A minimum of two years of management experience is required if the applicant does not hold an advanced degree.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 587
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Coursework (16 credits)**

Take the following courses:
- **NURS 5115** - Interprofessional Health Care Informatics (3.0 cr)
- **NURS 5611** - Database Principles for Healthcare (2.0 cr)
- **NURS 6105** - Systems Analysis and Design (3.0 cr)
- **NURS 7051** - Data Science for Healthcare (2.0 cr)
- **NURS 7105** - Knowledge Representation and Interoperability (2.0 cr)
- **NURS 7108** - Population Health Informatics (2.0 cr)
- **NURS 7113** - Clinical Decision Support: Theory (2.0 cr)
Twin Cities Campus
Master of Nursing M.N.
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Office of Student Career and Advancement Services, 2-139 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 51
- This program requires summer semesters for timely completion.
- Degree: Master of Nursing

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of nursing degree (MN) is an accelerated, entry level, full-time, 16-month, graduate-level program for students with a baccalaureate (or higher) degree in a non-nursing field. The program includes all the essentials of a bachelor of science in nursing (BSN) program, plus additional graduate work. Upon completion of the coursework, students are eligible to take the National Council Licensure Examination for Registered Nurses (NCLEX-RN) and are also eligible for Public Health Nursing (PHN) certification in Minnesota. Traditional classroom formats are complemented by interactive components such as simulation. Variable practicum hours and required throughout the program at partner practicum sites.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Completion of a baccalaureate degree from an accredited institution in a non-nursing area of study completed no later than June 1 prior to start of fall semester for year admitted.

Other requirements to be completed before admission:
There are nine prerequisite courses to complete before the start of the master of nursing (MN) program: General Chemistry, Human Anatomy, Human Physiology, Microbiology, Pathology, Human Nutrition, Lifespan Growth and Development, Abnormal Psychology, Inferential Statistics.

Five courses must be completed, with final grades sent to the School of Nursing, by the application deadline. Students are recommended to make three of the five courses their science courses.

Special Application Requirements:
Prior to matriculation to the program, students must complete a Minnesota background check, immunizations, submit provider-level CPR verification, and meet the School of Nursing published technical standards. Application to the Master of Nursing program is available on the School of Nursing website. After a preliminary review of submitted materials, selected applicants are invited to participate in an interview with representatives of the admissions committee.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- IELTS
- Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 51 major credits and up to null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must maintain the compliance requirements (Minnesota background check, immunizations, provider-level CPR verification, and School of Nursing published technical standards) throughout the program.

**Required Coursework**

- **NURS 5029** - Introduction to Nursing Interventions (3.0 cr)
- **NURS 5030** - Foundational Concepts of Professional Nursing (3.0 cr)
- **NURS 5031** - Human Response to Health and Illness: Adults and Elders (4.0 cr)
- **NURS 5032** - Human Response to Health and Illness: Children and Childbearing Families (5.0 cr)
- **NURS 5033** - Population-Focused Health in Public Health and Mental Health Nursing (5.0 cr)
- **NURS 5034** - Transition to Professional Nursing Practice (3.0 cr)
- **NURS 5035** - Practicum Nursing Care for Complex Health Conditions (4.0 cr)
- **NURS 5115** - Interprofessional Health Care Informatics (3.0 cr)
- **NURS 5190** - Essentials of Holistic Health Assessment and Foundational Clinical (3.0 cr)
- **NURS 5222** - Advanced Human Physiology (2.0 cr)
- **NURS 5226** - Advanced Human Pathophysiology (2.0 cr)
- **NURS 5241** - Nursing Leadership for Effective Practice (2.0 cr)
- **NURS 6200** - Science of Nursing Intervention (3.0 cr)
- **NURS 7202** - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- **NURS 7600** - Nursing Research and Evidence Based Practice (4.0 cr)
- **PHAR 5800** - Pharmacotherapy for the Health Professions (3.0 cr)
Twin Cities Campus

Nurse Midwifery Postgraduate Certificate

School of Nursing

School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 24 to 38
- This program requires summer semesters for timely completion.
- Degree: Nurse Midwifery Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nurse midwifery offers students with a doctor of nursing practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by American Midwifery Certification Board & Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv. physiology, adv. pathophysiology, pharmacology, pharmacotherapeutics, adv.health assessment is required for admission to this program

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where postsecondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous DNP degree and coursework. Final coursework decisions are made by the faculty advisor. A 3.0 cumulative GPA is required.

Specialty Courses (24 Credits)
Complete the following required specialty courses for the certificate. Credit requirements for courses with variable credits: Take NURS 6305 for 3 credits; NURS 6308 for 2 credits; and NURS 6925 for 2 credits.

- NURS 6210 - Midwifery Care of the Childbearing Family (3.0 cr)
- NURS 6211 - Midwifery Care of the Childbearing Family Practicum (2.0 cr)
- NURS 6213 - Reproductive Healthcare for Patients with Complex Conditions (2.0 cr)
- NURS 6214 - Reproductive Health Care for Patients with Complex Conditions Practicum (2.0 cr)
- NURS 6302 - Racism and Health Disparity Prevention for Midwives (1.0 cr)
- NURS 6305 - Reproductive and Sexual Health Care (3.0 cr)
- NURS 6306 - Reproductive and Sexual Health Practicum (1.0 cr)
- NURS 6308 - Women's Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6925 - Advanced Concepts in Reproductive and Sexual Health Care (2.0 - 3.0 cr)
- NURS 7213 - Midwifery Clinical and Professional Integration (3.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 12 Credits)
Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 3 credits.

- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)

Labor and Delivery Competencies (2 Credits)
Students are required to complete NURS 5505 if they do not have labor and delivery experience as a registered nurse.

- NURS 5505 - Assessment and Support of Individuals in Labor (2.0 cr)
Twin Cities Campus
Nursing Ph.D.
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: gophernursing@umn.edu
Website: https://www.nursing.umn.edu/degrees-programs/phd-nursing

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 60 to 73
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in nursing prepares scholars as scientists, leaders, innovators, and educators in nursing who:
- Discover new knowledge for nursing science practice through innovative, theory-based, ethical research;
- Integrate knowledge to influence health care delivery and policy through collaborative, interprofessional initiatives at organizational, local, state, regional, national, and global levels;
- Create and evaluate strategies to improve the health and well-being of individuals, families, communities, and populations; and
- Disseminate knowledge to those in nursing, other health sciences, policy makers, and the public through scholarly publication, formal teaching, and other creative venues.

The PhD in Nursing courses are delivered with blended instruction offering students the flexibility to attend class in person or connect in a synchronous remote format, both with some asynchronous activities. All students will come to campus for a for-credit 4-day immersive experience to engage with fellow students and PhD faculty. The intensives take place in late August for newly admitted students and annually in late May.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
- MELAB
  - Final score: 85

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

36 to 49 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Core Coursework (26 credits)
Take the following courses. Take 1 credit of NURS 8177.
- **NURS 8131** - Theory in Nursing Research (4.0 cr)
- **NURS 8132** - Qualitative Research for Nursing and Health Care (4.0 cr)
- **NURS 8141** - Designing Quantitative and Intervention Nursing Research (3.0 cr)
- **NURS 8142** - Quantitative Data Collection Methods and Measurement for Nursing Research (3.0 cr)
- **NURS 8152** - Advanced Ethics in Nursing Research and Scholarship (2.0 cr)
- **NURS 8153** - Developing Research Proposals in Nursing or Health Sciences (2.0 cr)
- **NURS 8177** - Advanced Nursing Research Practicum (1.0 - 2.0 cr)
- **NURS 8190** - Critical Review in Nursing and Health Research (2.0 cr)
- **NURS 8201** - Transition to Becoming a Scientist of Nursing (1.0 cr)
- **NURS 8202** - Developing a Foundation as a Scientist of Nursing (1.0 cr)
- **NURS 8203** - Expanding Leadership and Team Skills of the Scientist of Nursing (1.0 cr)
- **NURS 8204** - Transition to Post-PhD Roles and Scholarship (1.0 cr)
- **NURS 8255** - Dissertation Seminar (1.0 cr)

Statistics (6 credits)
Select at least 6 statistics credits from the following in consultation with the faculty advisor:
- **Biostatistics**
  - **PUBH 6450** - Biostatistics I (4.0 cr)
  - **PUBH 6451** - Biostatistics II (4.0 cr)
- **or EPSY 8251** - Statistical Methods in Education I (3.0 cr)
- **EPSY 8252** - Statistical Methods in Education II (3.0 cr)

Electives (4 credits)
Select at least 4 credits from the following in consultation with the advisor:
- **NURS 7051** - Data Science for Healthcare (2.0 cr)
- **NURS 8195** - Mixed Methods Research (2.0 cr)
- **NURS 8212** - Planetary Health: Cross-Cutting Principles for Nursing Research (2.0 cr)
- **NURS 8215** - Emerging Topics in Nursing Research and Health Sciences (2.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
- **NURS 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Graduate Nursing Foundation Coursework
All students, with the exception of those with a completed Nursing MS degree, complete the following foundational coursework in consultation with the advisor.

Students New to Nursing (13 credits)
Students with a non-nursing baccalaureate or graduate degree take the following courses:
- **CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
- **NURS 5030** - Foundational Concepts of Professional Nursing (3.0 cr)
- **NURS 6200** - Science of Nursing Intervention (3.0 cr)
- **NURS 7000** - DNP Proseminar (1.0 cr)
- **NURS 7610** - System Leadership and Innovation (3.0 cr)

-OR-

Entry-level Nurses (10 credits)
Students with a baccalaureate or entry-level masters degree in nursing take the following courses:
- **CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
- **NURS 6200** - Science of Nursing Intervention (3.0 cr)
- **NURS 7000** - DNP Proseminar (1.0 cr)
- **NURS 7610** - System Leadership and Innovation (3.0 cr)
Twin Cities Campus

Pediatric Clinical Nurse Specialist Postgraduate Certificate

School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 20 to 32
- This program requires summer semesters for timely completion.
- Degree: Pediatric Clinical Nurse Specialist Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv.physiology, adv. pathophysiology, pharmacology, pharmacotherapeutics, adv.health assessment is required for admission to this program

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous DNP degree and coursework; final coursework decisions are made by the faculty advisor. A 3.0 cumulative GPA is required.

Specialty Courses (20 Credits)
Complete the following courses for a total of 20 credits. Take NURS 6921 for 1 credit.

- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 6405 - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- NURS 6406 - Advanced Practice CNS Roles Across the Lifespan: Practicum (1.0 cr)
- NURS 6519 - Advanced Pediatric Assessment (1.0 cr)
- NURS 6920 - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
- NURS 6921 - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 6929 - Advanced Nursing Care of Children with Acute Illness; Practicum for PCNS (2.0 cr)
- NURS 7925 - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
- NURS 7926 - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 7927 - [Inactive] (1.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 12 Credits)
Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 3 credits.

- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
Twin Cities Campus
Pediatric Nurse Practitioner - Acute Care Post-Graduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing - CFH
Room 5-140 WDH
308 Harvard St SE
Minneapolis, MN 55455
Email: gophernursing@umn.edu
Website: https://nursing.umn.edu/academics/certificates/post-graduate-certificate-program-overview

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 16 to 28
- This program requires summer semesters for timely completion.
- Degree: Pediatric Nurse Practitioner - Acute Care Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (DNP) degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examination.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv. physiology, adv. pathophysiology, pharmacology, pharmacotherapeutics, adv. health assessment is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Advanced Practice Registered Nurse Core Courses (0 to 12 credits)
Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 3 credits.

- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)

Required Courses (16 credits)
Take the following courses. NURS 7312 should be taken for 2 credits; NURS 7314 should be taken for 3 credits; NURS 7324 should be taken for 3 credits.

- NURS 5227 - Pharmacology for Pediatric Nurse Practitioner - Acute Care (2.0 cr)
- NURS 7312 - Pediatric Nurse Practitioner - Acute Care Skills Practicum (1.0 - 2.0 cr)
- NURS 7313 - Pediatric Nurse Practitioner Acute Care I (3.0 cr)
- NURS 7314 - Pediatric Nurse Practitioner Acute Care Practicum I (2.0 - 3.0 cr)
- NURS 7323 - Pediatric Nurse Practitioner Acute Care II (3.0 cr)
- NURS 7324 - Pediatric Nurse Practitioner Acute Care Practicum II (2.0 - 3.0 cr)
Twin Cities Campus

Pediatric Nurse Practitioner - Primary Care Postgraduate Certificate
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 18 to 30
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv. physiology, adv. pathophysiology, pharmacology, pharmacotherapeutics, adv. health assessment is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Coursework (18 credits)

Take the following courses. Nurs 6921 must be completed for 2 credits.

- **NURS 6519** - Advanced Pediatric Assessment (1.0 cr)
- **NURS 6920** - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
- **NURS 6921** - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- **NURS 6922** - Primary Care: Assessment and Management of Common Conditions Affecting Children (3.0 cr)
- **NURS 6923** - Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children (2.0 cr)
- **NURS 6924** - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
- **NURS 7925** - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
- **NURS 7926** - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
- **NURS 7927** [Inactive](1.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 12 credits)

Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 3 credits.

- **NURS 5200** - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- **NURS 5222** - Advanced Human Physiology (2.0 cr)
- **NURS 5226** - Advanced Human Pathophysiology (2.0 cr)
- **NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
- **NURS 5229** - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
**Twin Cities Campus**

Population Health Informatics & Technology Post Baccalaureate Certificate

School of Nursing

Link to a list of faculty for this program.

**Contact Information:**
6-169 Weaver Densford Hall
308 Harvard St SE Minneapolis, MN 55455
Email: gophernursing@umn.edu
Website: [http://nursing.umn.edu](http://nursing.umn.edu)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Population Health Informatics & Tech PBacc Cert

Along with the program-specific requirements listed below, please read the [General Information](http://nursing.umn.edu) section of the catalog website for requirements that apply to all major fields.

The Population Health Informatics and Technology (PHIT) Post-Baccalaureate Certificate prepares trainees to harness the power of data for improving public and population health. Students will learn about various information systems in public health, electronic data exchanges and tools for consumer engagement along with the utility of data for health equity and better population health. The certificate courses are offered in a fully online format and includes a practicum that provides experience in public health and non-profit care settings. The PHIT certificate is funded in part by a grant from the Office of the National Coordinator for Health Information Technology for Public Health IT Workforce Development.

### Program Delivery

This program is available:
- completely online (all program coursework can be completed online)

### Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the program requires a baccalaureate degree from an accredited institution.

Other requirements to be completed before admission:
- A personal statement describing professional qualifications and goals after completing the certificate program must be uploaded to the online application.
- Applicants must submit a current curriculum vitae (preferred) or resume complete with professional accomplishments and activities.
- Applicants must submit two professional reference letters which attest to the applicants potential for program success (preparation, initiative, and aptitude) and commitment to the profession.

### Special Application Requirements:

International students who want to attend this program on a student visa should contact the University’s International Student and Scholar Services (ISSS) office at [https://isss.umn.edu/](https://isss.umn.edu/).

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- **MELAB**
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](http://nursing.umn.edu) (TOEFL, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Coursework (8 credits)
- NURS 5116 - Consumer Health Informatics (2.0 cr)
- NURS 5117 - Consumer Health Informatics Practicum (2.0 cr)
- NURS 7105 - Knowledge Representation and Interoperability (2.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)

Intro to Public Health informatics and Information Systems (2 credits)
Choose one course for 2 credits
- NURS 6881 - Introduction to Public Health Informatics and Information Systems (2.0 cr)
- or PUBH 6880 - Introduction to Public Health Informatics (2.0 cr)

Public Health Informatics Practicum (2 credits)
Choose 1 course for 2 credits.
- NURS 7109 - Population Health Informatics Practicum (2.0 cr)
- or PUBH 7796 - Applied Practice Experience: Public Health Administration and Policy (2.0 cr)
Twin Cities Campus
Psychiatric Mental Health Nurse Practitioner Postgraduate Certificate
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 20 to 32
- This program requires summer semesters for timely completion.
- Degree: Psych Mental Hlth Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv. physiology, adv. pathophysiology, pharmacology, pharmacotherapeutics, adv. health assessment is required for admission to this program

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Contact the School of Nursing for detailed information about the requirements for this certificate. Each student's course of study will be unique, based on their previous DNP degree and coursework, and will require approval of the faculty advisor. A 3.0 cumulative GPA is required.

Coursework (20 credits)
Select courses from the following list, or select alternative courses, in consultation with the advisor.

- NURS 6604 - Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing (2.0 cr)
- NURS 6605 - Psychiatric/Mental Health Advanced Nursing Practice Practicum I (1.0 cr)
- NURS 6504 - Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing (2.0 cr)
- NURS 5225 - Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing (3.0 cr)
- NURS 6505 - PMH/APN Prac II: Assessing, Managing Psychiatric Disorders in Adv Prac Psychiatric-Mental Health Nurs (2.0 cr)
- NURS 6602 - PMH Advanced Practice Nursing: Group as a Health Care Intervention (2.0 cr)
- NURS 6603 - PMH APN Practicum IV: Group as a Health Care Intervention (2.0 cr)
- NURS 7612 - Psychiatric/Mental Health Advanced Practice Nursing: Professional Seminar (1.0 cr)
- NURS 7613 - Psychiatric/Mental Health Advanced Practice Nursing: Practicum V (2.0 cr)
- NURS 6802 - Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families (2.0 cr)
- NURS 6803 - Psychiatric/Mental Health Adv Prac Nurs Practicum III: Psychotherapy With Individuals, Families (1.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 12 credits)
Completion of the following coursework is required for the post-graduate certificate program. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 3 credits.

- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
Women's Health/Gender Related Nurse Practitioner Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 21 to 33
- This program requires summer semesters for timely completion.
- Degree: Ad Hlth/Wmn Hlth Care Nrs Pract Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DNP with coursework in the 3 of the 5 following subject areas: adv. physiology, adv. pathophysiology, pharmacology, pharmacotherapeutics, adv. health assessment is required for admission to this program

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

3.0 cumulative GPA is required.

Specialty Courses (21 Credits)
Complete the following required specialty courses for the certificate. NURS 6305 and NURS 6925 each must be taken for 3 credits.

- NURS 6305 - Reproductive and Sexual Health Care (3.0 cr)
- NURS 6306 - Reproductive and Sexual Health Practicum (1.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6925 - Advanced Concepts in Reproductive and Sexual Health Care (2.0 - 3.0 cr)
- NURS 6926 - Advanced Concepts in Women's Health for WHNP Practicum I (1.0 cr)
- NURS 6927 - Advanced Concepts in Women's Health II (3.0 cr)
- NURS 6928 - Adv Concepts in Women's Health II WHNP Prac (1.0 cr)
- NURS 6213 - Reproductive Healthcare for Patients with Complex Conditions (2.0 cr)
- NURS 6214 - Reproductive Health Care for Patients with Complex Conditions Practicum (2.0 cr)
- NURS 7310 - WHNP Clinical and Professional Integration (2.0 cr)

Advanced Practice Registered Nurse Core Courses (0 to 12 Credits)
Completion of the following coursework is required for the certificate. Students who have not completed these courses or their equivalents prior to admission must do so to meet requirements. Consult with the Doctor of Nursing Practice Program Director to evaluate prior APRN coursework for equivalency. NURS 5229 must be taken for 3 credits.

- NURS 5200 - Advanced Holistic Health Assessment for the Advanced Practice Nurse (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (3.0 - 4.0 cr)
Twin Cities Campus
Advanced Management Training for Clinician Leaders Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health
MMC 819, A395 Mayo Memorial Building
420 Delaware Street SE
Minneapolis, MN 55455
Phone: (612)626-3500
Fax: (612)624-4498
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 13
- This program requires summer semesters for timely completion.
- Degree: Adv Mgmt Training for Clin Leaders PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: Applications to the Advanced Management Training for Clinician Leaders Certificate program are not being accepted at this time. For more information, please contact sph-ask@umn.edu.

The Regents Certificate in Advanced Management Training for Clinician Leaders is intended for clinicians employed by integrated health systems who will take on critical and expanded roles as executives and managers. This one-year course of study will prepare clinician leaders for successful innovation in emerging forms of healthcare organizations, bring new healthcare leaders with clinical backgrounds into network relationships with other administrators, and consider new approaches to strategy and success in healthcare that are specific to integrated systems.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have at least two years experience in a US-based healthcare organization that either has developed or is considering integrated system relationships. International applications will be considered on a case-by-case basis with special attention paid to the nature and structure of their employing organizations.

Special Application Requirements:
NOTE: Applications to the Advanced Management Training for Clinician Leaders Certificate program are not being accepted at this time. For more information, please contact sph-ask@umn.edu.
Applicants must submit a letter of intent describing career interests and the relevance of the certificate to the applicant's personal development. One letter of recommendation from a person qualified to assess the applicant's academic work; clinical, public health or professional experience; or leadership potential in integrated health systems is required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The certificate is build on a cohort model and comprises 13 credits: five 2-credit courses, one 1-credit face-to-face course and a 2-credit face-to-face practicum. Students will be required to attend on-campus sessions twice during the program. The first on-campus session will be four days in length, during which students will complete a 1-credit course, PUBH 7571. The second session will be held at the end of the program over three days, during which students will present their capstone projects.

**Requirements**

The certificate requires 13 total credits. PUBH 7571, PUBH 7572, along with four brand-new courses and a practicum/capstone project (each offered as topics courses via PUBH 6570) make up the requirements for the program. Students complete PUBH 7571 while on campus during for four days at the start of the program, and will complete five courses online during the remaining 12 months. Students will present their capstone projects completed for the practicum during their final three days on campus.

- **PUBH 7572** - Health Care Strategies in Competitive Markets (2.0 cr)
- **PUBH 6570** - Healthcare Administration (1.0 - 4.0 cr)
Twin Cities Campus

Aging Studies Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Aging Studies PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: Applications to the Aging Certificate program are not being accepted at this time. For more information, please contact sph-ask@umn.edu. The Certificate on Aging is a 12-credit graduate level program with some courses offerings available online, as well as in a face-to-face format. The certificate is designed to increase knowledge and understanding in the multifaceted field of human aging. This interdisciplinary program provides students with the background and confidence necessary to meet the challenges of serving the aging population. The courses are offered through the Center on Aging within the Division of Health Policy and Management.

Aging studies at the University of Minnesota involves an interdisciplinary approach to gerontology for those individuals who hold at least a bachelor's degree. The interdisciplinary nature of the program embraces different backgrounds and interests, and is suitable for graduates from any major.

The primary purpose of aging studies is to prepare professionals for work in programs, businesses, organizations, and agencies that address the needs of an aging population. Examples include the following: hospitals, long-term care facilities, education, clinics, home health care agencies, hospice and end-of-life care organizations, insurance groups, counseling and social services, physician groups, financial planning, architecture and design, public policy makers, and nursing.

Accreditation
This program is accredited by CEPH

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
NOTE: Applications to the Aging Certificate program are not being accepted at this time. For more information, please contact sph-ask@umn.edu. Students who have completed 16-semester credits/24-quarter credits (within the past 24 months) in an academic program in a recognized institution of higher learning in the U.S. do not need to submit the TOEFL as part of the application process.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

**Suggested Coursework**

Select coursework from the following list, or other courses in consultation with the director of graduate studies, to meet the 12-credit minimum.

- **FSOS 8105** - Family Gerontology (3.0 cr)
- **GERO 5100** - Topics in Gerontology (0.5 - 4.0 cr)
- **GERO 5111** - Studying Aging and Chronic Illness (2.0 cr)
- **GERO 5125** - Gerontology Service Learning (1.0 - 3.0 cr)
- **SOC 8590** - Topics in Life Course Sociology (3.0 cr)
- **PUBH 6904** - Nutrition and Aging (2.0 cr)
American Indian Public Health and Wellness Minor

Contact Information:
School of Public Health, MMC 819, Room A395 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636)
Email: sph.ask@umn.edu
Website: http://www.sph.umn.edu

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This minor is designed to help students understand how to work respectfully and effectively with federally recognized Tribes and American Indian communities, to understand the basis of health and wellness services, and the implications of specific tribal (local and federal) law to help improve the devastating health issues currently experienced by American Indians.

Students from all races, cultures, and experiences are welcome to declare the Minor. While the focus is on American Indians, there are advantages to learning accurate history, other populations' prevention health models, innovative humility and health in all services, and the importance of using a holistic approach of health and wellness for all populations.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must be enrolled in a University master's or doctoral degree-granting program. Consult with the program advisor, then contact the American Indian Public Health and Wellness director of graduate studies regarding requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required courses must be taken A-F, and a minimum grade of B- must be earned.
The overall minimum GPA for coursework applied to the minor is 3.0.

Required Coursework (6 credits)
Take the following courses:
PUBH 6241 - American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration (2.0 cr)
PUBH 6242 - Cultural Humility with American Indian Populations (2.0 cr)
PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)

Program Sub-plans

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Information current as of November 07, 2022
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral Electives (6 credits)**
Select elective credits, in consultation with the advisor and the American Indian Public Health and Wellness director of graduate studies, to complete the 12-credit minimum.

- **AMIN 5107** - The Structure of Anishinaabemowin: The Ojibwe Language (3.0 cr)
- **AMIN 5141** - American Indian Language Planning (3.0 cr)
- **AMIN 5202** - Indigenous Peoples and Issues Before the United States Supreme Court (3.0 cr)
- **AMIN 5402** - American Indians and the Cinema [AH, DSJ] (3.0 cr)
- **AMIN 5412** - Comparative Indigenous Feminisms [GP] (3.0 cr)
- **AMIN 5890** - Readings in American Indian and Indigenous History (3.0 cr)
- **AMIN 8910** - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
- **CI 8645** - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
- **CSPH 5212** - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- **DAKO 5126** - Advanced Dakota Language I (3.0 cr)
- **DAKO 5129** - Advanced Dakota Language II (3.0 cr)
- **LAW 6236** *(Inactive)*
- **OJIB 5106** - Advanced Ojibwe Language I (3.0 cr)
- **OJIB 5109** - Advanced Ojibwe Language II (3.0 cr)
- **OJIB 5202** - Ojibwe Mastery I (3.0 cr)
- **PUBH 6244** - American Indian Health & Wellness Equity (2.0 cr)
- **PUBH 6245** - American Indian Environmental Health Tribal Case Studies (2.0 cr)
- **PUBH 6246** - General History of American Indians Post Colonization and Review of Historical Trauma (2.0 cr)
American Indian Public Health and Wellness Post-Baccalaureate Certificate

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street SE
Minneapolis, MN 55455
(612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: https://www.sph.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The American Indian Public Health and Wellness certificate prepares students to understand how to work respectfully and effectively with Tribes and American Indian communities, to understand the basis of health services, and study the implication of specific local and federal laws to improve the health issues currently experienced by American Indians.

Students from all races, cultures, and experience are welcome to pursue the certificate. While the focus is on American Indians, there are advantages to learning accurate history, other health models, innovative health services, and the importance of using a holistic approach of health and wellness for all populations. Increasing the knowledge of health professionals (e.g., state, federal, educational institutions and private public health employees) and increasing a culturally prepared workforce is the aim of this certificate.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Coursework (6 credits)
Take the following courses. All required courses must be taken A-F.
- PUBH 6241 - American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration (2.0 cr)
- PUBH 6242 - Cultural Humility with American Indian Populations (2.0 cr)
- PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)

Electives (6 credits)
Choose electives in consultation with the advisor to complete the 12-credit minimum.
- AMIN 5107 - The Structure of Anishinaabemowin: The Ojibwe Language (3.0 cr)
- AMIN 5141 - American Indian Language Planning (3.0 cr)
- AMIN 5202 - Indigenous Peoples and Issues Before the United States Supreme Court (3.0 cr)
- AMIN 5402 - American Indians and the Cinema [AH, DSJ] (3.0 cr)
- AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
AMIN 5412 - Comparative Indigenous Feminisms [GP] (3.0 cr)
AMIN 5890 - Readings in American Indian and Indigenous History (3.0 cr)
AMIN 8910 - Topics in American Indian and Indigenous Studies (1.0 - 3.0 cr)
ANTH 5601 - Archaeology and Native Americans [DSJ] (3.0 cr)
CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
PUBH 6244 - American Indian Health & Wellness Equity (2.0 cr)
PUBH 6245 - American Indian Environmental Health Tribal Case Studies (2.0 cr)
PUBH 6246 - General History of American Indians Post Colonization and Review of Historical Trauma (2.0 cr)
Twin Cities Campus
Applied Biostatistics Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware St, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu/

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2022
• Length of program in credits: 15
• This program requires summer semesters for timely completion.
• Degree: Applied Biostatistics PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This primarily online certificate program is designed for working biostatisticians, such as data managers and analysts, who are not formally trained and want to improve their technical, mathematical, and computational skills.

The certificate focuses on key aspects of study design, implementation, and analysis for observational and clinical studies.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
• primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission preferences and prerequisites:
- Bachelor's degree
- Strong GPA in math and science coursework
- Strong written skills
- Work experience

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application requirements and instructions visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
• TOEFL
- Internet Based - Total Score: 100
- Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses must be taken A-F, unless offered only S/N. The minimum grade for each A-F graded course is B-.

**Required Coursework (15 credits)**
Select PUBH 6431 or PUBH 6432 in consultation with the advisor.
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 6431 - Topics in Hierarchical Bayesian Analysis (1.0 cr)
  or PUBH 6432 - Biostatistical Methods in Translational and Clinical Research (1.0 cr)
Twin Cities Campus

Biostatistics M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The biostatistics master's degree programs teach and develop statistical skills to put numbers into context as part of public health research for solving human health-related problems. With an MS in biostatistics, students will have the skills to collaborate on the design of biomedical studies, analyze data, and communicate the results for researchers.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.10.

Other requirements to be completed before admission:
The admissions committee reviews applicants according to their record of academic achievement, demonstrated academic potential, letters of recommendation, background and experience, and other factors. GPA and standardized test scores provide competitive points of preference for admission but are not alone decisive in the admissions review. At least three semesters of calculus (including multivariable calculus) and one semester of linear algebra, as well as a year (two semesters) of coursework in undergraduate-level probability and mathematical statistics are recommended. Experience with a programming language (e.g., R, Java, C, Python) and exposure to applied statistics is helpful, but not required.

Special Application Requirements:
Applications are accepted for fall semester admission only.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of November 07, 2022
Program Requirements

Plan B: Plan B requires 36 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: PUBH 7494, Integrated Learning Experience, 1 credits

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Courses offered on both the A-F and S/N grading basis must be taken A-F.

Biostatistics Plan B Requirements (36 credits)
In consultation with advisor, students complete 36 credits.

Biostatistics Core (18 credits)
- PUBH 7405 - Biostatistical Inference I (4.0 cr)
- PUBH 7406 - Biostatistical Inference II (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7465 - Biostatistics Consulting (2.0 cr)
- STAT 5101 - Theory of Statistics I (4.0 cr)
  or STAT 8101 - Theory of Statistics 1 (3.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
  or STAT 8102 - Theory of Statistics 2 (3.0 cr)

Public Health Foundations (2 credits)
- PUBH 6250 - Foundations of Public Health (2.0 cr)

Biostatistics Electives (9 credits)
Students complete courses in consultation with advisor to meet the 36-credit minimum.

Computing and Machine Learning (3 credits)
Take 3 or more credit(s) from the following:
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 7460 - Advanced Statistical Computing (3.0 cr)
- PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
- PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)

Additional Electives (6 credits)
Take 6 or more credit(s) from the following:
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
- PUBH 7485 - Methods for Causal Inference (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)

Plan B Project (1 credit)
- PUBH 7494 - Integrative Learning Experience: Biostatistics (1.0 - 3.0 cr)
Twin Cities Campus
Biostatistics Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12 to 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in Biostatistics is designed to familiarize students with the statistical tools necessary to analyze health science data. By taking public health courses focused on the fundamentals of statistical methodologies and programming techniques, students will gain skills that enable them to be involved in the design and analysis of quantitative studies as part of their future professional career or graduate study in an applied field.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer first with their major field advisor and director of graduate studies, and the Biostatistics director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor courses may require prerequisites.

PhD students must obtain pre-approval from the Biostatistics director of graduate studies for proposed minor field coursework.

No more than one course can be taken S/N. Approval by the Biostatistics director of graduate studies is required.

The minimum cumulative GPA for minor coursework is 3.00.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

**Required Courses (6 credits)**
Select 6 credits from the following in consultation with the Biostatistics director of graduate studies:

- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 7485 - Methods for Causal Inference (3.0 cr)

Students may take 7415 or 7420 but not both.

- **PUBH 7415** - Introduction to Clinical Trials (3.0 cr)
- **or PUBH 7420** - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Doctoral

**Coursework Options**

**Coursework for Statistics PhD students (12 credits)**

**Required Courses (6 credits)**
Take the following courses:

- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)

**Electives (6 credits)**
Select at least 6 credits, in consultation with the Biostatistics director of graduate studies, from the following list:

- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
- PUBH 8462 - Advanced Survival Analysis (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 8482 - Sequential and Adaptive Methods for Clinical Trials (3.0 cr)
- PUBH 8485 - Methods for Causal Inference (3.0 cr)

**or Coursework for non-Statistics PhD students (13 to 14 credits)**

**Required Course Sequence (7 to 8 credits)**
Select one of the following course sequences, in consultation with the Biostatistics director of graduate studies:

**Sequence 1**

- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)

**or Sequence 2**

- PUBH 7405 - Biostatistical Inference I (4.0 cr)
- PUBH 7406 - Biostatistical Inference II (3.0 cr)

**Electives (6 credits)**
Select at least 6 credits, in consultation with the Biostatistics director of graduate studies, from the following list:

- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 7485 - Methods for Causal Inference (3.0 cr)

Students may take 7415 or 7420 but not both.

- **PUBH 7415** - Introduction to Clinical Trials (3.0 cr)
- **or PUBH 7420** - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
### Twin Cities Campus

**Biostatistics Ph.D.**  
*School of Public Health - Adm*  
*School of Public Health*

Link to a [list of faculty](#) for this program.

**Contact Information:**  
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)  
Email: [sph-ask@umn.edu](mailto:sph-ask@umn.edu)  
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- **Program Type:** Doctorate  
- **Requirements for this program are current for Fall 2022**  
- **Length of program in credits:** 53 to 67  
- **This program does not require summer semesters for timely completion.**  
- **Degree:** Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The biostatistics PhD prepares graduates to conduct original research, collaborate and consult with biomedical researchers, implement and disseminate results of this research, and teach and mentor others in the field.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.70.

Other requirements to be completed before admission:  
At least three semesters of calculus (including multivariable) and one semester of linear algebra, and two semesters of undergraduate courses in probability and mathematical statistics are strongly recommended. Real analysis or an equivalent is recommended. Experience with programming language (e.g., R, Java, C) and exposure to applied statistics is helpful, but not required.

In addition to completing the SOPHAS application, applicants must submit the following directly to SOPHAS:  
- Statement of purpose and objectives (an essay describing past education, experience, and current professional career objectives)  
- Résumé or curriculum vitae  
- Official postsecondary transcripts from all institutions attended, including previous study at the University of Minnesota (have transcripts sent directly from the institutions to SOPHAS)  
- Three letters of recommendation from persons qualified to assess academic work; clinical, public health, or professional experience; and leadership potential

**Special Application Requirements:**  
Applications are accepted for fall semester admission only. All admitted international Ph.D. applicants are required to provide a World Education Services (WES) document verification report prior to beginning the program.

Proof of English Proficiency  
Applicants whose native language is not English, or whose academic study was done exclusively at non-English speaking institutions, must prove English proficiency by providing either official Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) scores. Official report of the scores should be sent directly to SOPHAS using designation code 5688 for the TOEFL or designation code SOPHAS for the IELTS. Scores must be less than two years old. The preferred minimum English language test scores for admission to the School of Public Health are listed below.

The English Language test requirement may be waived if an applicant can provide proof of one of the following:  
- Completion of 16 semester credits/24 quarter credits (within the past 24 months) in an academic program at a recognized institution of higher learning in the U.S. or Canada.  
- An Educational Commission for Foreign Medical Graduates (ECFMG) certificate. Students should have an official or attested copy
sent directly to the University of Minnesota School of Public Health at the address listed above.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

29 to 43 credits are required in the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.3 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students entering the program without a statistics or biostatistics master's degree may need to complete additional preparatory coursework in their first year, selected in consultation with the advisor and Biostatistics director of graduate studies upon admission. Those who have taken a real analysis course may need to complete MATH 4603 Advanced Calculus. Those who have taken a real analysis course are strongly encouraged, but not required to, take MATH 5615H. Preparatory coursework cannot be applied toward degree requirements.

Courses must be taken A-F, unless offered only S/N.

**Biostatistics Core Requirements (19 credits)**

- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 8401 - Linear Models (3.0 cr)
- PUBH 8403 - Research Skills in Biostatistics (1.0 cr)
- PUBH 8412 - Advanced Statistical Inference (3.0 cr)
- PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)

**Biostatistics Electives (9 credits)**

Select at least 9 credits, in consultation with the advisor, from the following:

- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7465 - Biostatistics Consulting (2.0 cr)
- PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
- PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
- PUBH 8462 - Advanced Survival Analysis (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 8482 - Sequential and Adaptive Methods for Clinical Trials (3.0 cr)
- PUBH 8485 - Methods for Causal Inference (3.0 cr)
- PUBH 8492 - Theories of Hierarchical and Other Richly Parametrized Linear Models (3.0 cr)

**Health Science Elective (1 credit)**

Take at least one credit offered by other School of Public Health divisions or Health Sciences programs. This course is chosen in
consultation with the advisor.
PUBH 6xxx
PUBH 7xxx
PUBH 8xxx

**Thesis Credits**
Take at least 24 doctoral thesis credits.
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Requirements for students entering the PhD without a master's in statistics or biostatistics**
Students entering the PhD without a master's in statistics or biostatistics must complete an additional 14 credits, selected in consultation with advisor.

**Additional Biostatistics Coursework (14 credits)**
Take the following courses:
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
- STAT 8102 - Theory of Statistics 2 (3.0 cr)
- PUBH 7405 - Biostatistical Inference I (4.0 cr)
- PUBH 7406 - Biostatistical Inference II (3.0 cr)
Twin Cities Campus
Climate Change and Health Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The main goal of the climate change and health (CCH) minor is to train students in the science of climate change and in the development and application of mitigation and adaptation strategies with which public health professionals can respond. There is a pressing need to develop a public health workforce that can navigate and adapt to climate change threats. The minor will provide students with a foundational understanding of the science of climate change, population social and health vulnerabilities, and practical skills in climate change modeling, surveillance, and programmatic and policy interventions at various levels (i.e., local, regional, state, national, global). The public approach is two-fold, with its focus on entire populations and on vulnerable populations (e.g., socially disenfranchised individuals who bear disproportionate climate-related health burdens).

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Climate Change and Health director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required minor field courses must be taken on the A-F grading basis, with a minimum grade of B- earned for each. Electives may be taken A-F or S/N.

The minimum cumulative GPA required for the minor is 3.00.
Take the following courses:

**PUBH 6154** - Climate Change and Global Health (3.0 cr)
**PUBH 6194** - Climate Change and Public Health: The Science and Public Health Responses (2.0 cr)

**Electives (3 to 7 credits)**
Masters students select 3 credits, and doctoral students select 7 credits from the following in consultation with the Climate Change and Health director of graduate studies to meet minimum credit requirements:

- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
- ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
- GCC 5005 - Innovation for Changemakers: Design for a Disrupted World [GP] (3.0 cr)
- GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
- GCC 5027 - Power Systems Journey: Making the Invisible Visible and Actionable [TS] (3.0 cr)
- GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
- GCC 5032 - Ecosystems Health: Leadership at the intersection of humans, animals and the environment [ENV] (3.0 cr)
- GCC 5034 - [Inactive] (3.0 cr)
- GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
- HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)
- LA 5003 - Climate Change Adaptation (3.0 cr)
- LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)
- PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
- PA 5722 - Economics of Environmental Policy (3.0 cr)
- PA 5724 - Climate Change Policy (3.0 cr)
- PUBH 6528 - Climate Change and Healthcare Delivery Organizations: Considerations for Healthcare Leaders and Prof (1.0 cr)
- VMED 5492 - Seminar: One Health and Infectious Diseases of Wildlife (2.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral**
Twin Cities Campus
Clinical Research M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 38
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS in clinical research is a graduate degree as well as a career development path for physician-scientists, clinical scholars, and biomedical researchers.

The clinical research MS program trains students to perform patient-oriented research, develop therapeutic interventions conduct clinical trials, write grants, and develop data analytic skills. The program offers maximum flexibility and it can be completed online and students have varied capstone project opportunities.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An advanced health professional degree (MD, DDS, DVM, DO, DNP, DC, PharmD, PhD, etc.) or other advanced doctoral degree in a clinical biomedical field from an accredited university.

Other requirements to be completed before admission:
Students must have completed or must be at an advanced stage of their clinical practice training. All applicants should have an identified mentor at the University of Minnesota who will provide them with a research project and guide their research prior to applying for admission. Applicants who are part of a University of Minnesota fellowship or residency program, should in addition, discuss their application with their fellowship or residency director. One of the three required recommendation letters must be from the mentor at the University of Minnesota willing to provide mentorship and access to a research project.

Special Application Requirements:
An official transcript verifying completion of an advanced health professional degree and training sufficient to be eligible for a license to practice. One of the three required recommendation letters and a completed School of Public Health Recommendation form from the clinical director of training supporting the applicant's potential as a clinical researcher.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan B:** Plan B requires 38 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students can opt to complete a manuscript or a grant proposal for their capstone project. The topic and scope of the project must be approved by the advisor and director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must complete both sessions of the University's Responsible Conduct of Research course, validated by ORTTA. Students also must complete the NIH's online training, Protection of Human Research Subjects, validated by electronic certificate upon successful completion.

A grade of at least B- must be earned for the core, epidemiology, and clinical trials courses taken on the A-F grade basis. If PUBH 6320 is taken, a grade of at least A- must be earned.

**Required Core Courses (16 credits)**

Take the following courses:

- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
- PUBH 6310 - Clinical Epidemiology I (1.0 cr)
- PUBH 6311 - Clinical Epidemiology II (1.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Epidemiology Course (3 credits)**

Select one of the following courses in consultation with the director of graduate studies.

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

**Clinical Trials Course (3 credits)**

Select one of the following courses in consultation with the director of graduate studies.

- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- or PUBH 7415 - Introduction to Clinical Trials (3.0 cr)

**Capstone Project (6 to 10 credits)**

Take 6 to 10 credits of PUBH 8394, in consultation with the advisor and director of graduate studies.

- PUBH 8394 - Capstone Project: Clinical Research (1.0 - 10.0 cr)

**Electives**

Select electives in consultation with the director of graduate studies to meet the 38-credit requirement.

- DENT 8100 - Topics in Advanced Periodontology: Literature Review (2.0 cr)
- DENT 8120 - Advanced Principles and Techniques of Orofacial Pain Disorders (2.0 cr)
- DENT 8121 - Current Literature in TMD and Orofacial Pain (1.0 cr)
- ECP 5220 - Regulatory Issues in Drug Research (2.0 cr)
- ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
- ECP 8100 - Seminar (1.0 cr)
- MICA 8013 - Translational Cancer Research (2.0 cr)
- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 8152 - Advanced Ethics in Nursing Research and Scholarship (2.0 cr)
- NURS 8172 - Theory and Theory Development for Research (3.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PUBH 6108 - Foundations of Global Health (2.0 cr)
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 6303 - Clinical Research Project Seminar (2.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6348 - Writing Research Grants (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
TMDP 8441 - Seminar in Temporomandibular Disorders & Orofacial Pain (1.0 cr)
VMED 5080 - Problems in Veterinary Epidemiology and Public Health (1.0 - 3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
Twin Cities Campus
Clinical Research Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Clinical Research PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program in clinical research is designed for research coordinators, clinical research project managers, and other health professionals who want to learn how to implement and manage clinical research studies. Applicants must have a bachelor’s degree and at least two years of relevant clinical experience or research experience. Students can pursue the certificate on a part-time basis.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Certificate applicants must have a bachelors degree and have at least two years of relevant clinical experience or research experience. The certificate program also accepts students enrolled in other Masters programs such as MPH or in doctoral degrees.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application requirements and instructions visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 100
- Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required courses must be taken for A-F grading basis and must achieve a grade of B- or above. Electives can be taken S/N or A-F. Electives taken A-F must achieve a B- or above.

Required Coursework (14 credits)
Take the following courses in consultation with the program director:
- PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Select 1 of the following 2 courses:
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Electives (2 credits)
Select 2 elective credits from the following in consultation with the program director:
- DENT 8100 - Topics in Advanced Periodontology: Literature Review (2.0 cr)
- DENT 8120 - Advanced Principles and Techniques of Orofacial Pain Disorders (2.0 cr)
- DENT 8121 - Current Literature in TMD and Orofacial Pain (1.0 cr)
- ECP 5220 - Regulatory Issues in Drug Research (2.0 cr)
- ECP 5620 - Drug Metabolism and Disposition (3.0 cr)
- ECP 8100 - Seminar (1.0 cr)
- MICA 8013 - Translational Cancer Research (2.0 cr)
- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 8152 - Advanced Ethics in Nursing Research and Scholarship (2.0 cr)
- NURS 8172 - Theory and Theory Development for Research (3.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- PUBH 6108 - Foundations of Global Health (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6303 - Clinical Research Project Seminar (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
TMDP 8441 - Seminar in Temporomandibular Disorders & Orofacial Pain (1.0 cr)
VMED 5080 - Problems in Veterinary Epidemiology and Public Health (1.0 - 3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
Twin Cities Campus
Community Health Promotion M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Community Health Promotion (CHP) MPH program trains students to work with populations to improve health. The curriculum emphasizes the importance of using research and social science to assess population behavioral health patterns and psychosocial risk factors: students learn to design community wide prevention and intervention programs, how to influence health policies, and evaluate outcomes of behavioral health change.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Baccalaureate degree or higher from an accredited college or university. College-level courses in the following areas: social and behavioral sciences (at least 3 courses) and introductory statistics (1 course).

Special Application Requirements:
Applicants must have one year of paid or volunteer experience in a public health, social service, or community setting.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 48 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Students complete an Integrated Learning Experience (ILE) in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

All core courses, as well as PUBH 6050, 6051, 6034 (or 6852), and 6035 must be completed A/F and with a minimum grade of B-.

All Health Behavior and Policy Interventions coursework requires a B- grade.

Public Health Core Requirements (15 credits)
- PUBH 6050 - Community Health Promotion I: Integrating Theory, Evidence, and Context (3.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Epidemiology
Select one of the following:
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Community Health Promotion Requirements (8-9 credits)
All courses in this section require a minimum of a B-:
- PUBH 6034 - Evaluation I: Concepts (3.0 cr)
- or PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6035 - Evaluation II: Applications (3.0 cr)
- PUBH 6051 - Community Health Promotion II: Developing, Implementing, and Justifying Interventions (3.0 cr)

Evaluation-related Methods
Select one of these courses in consultation with your advisor.
- PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
- PUBH 6243 - American Indian Research, Evaluation and Collaborations (2.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6815 - Community-based Participatory Research (2.0 cr)

Health Behavior and Policy Interventions (8 credits)
All Health Behavior and Policy Interventions coursework requires a B- grade.
Take 6045 and/or 6078 and courses from the following list totaling at least 8 credits. Students must that at least one of 6045/6078 but may take both to count toward the eight credits.

Required Policy Course
- PUBH 6045 - Skills for Policy Development (1.0 cr)
- or PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)

Other Health Behavior and Policy Interventions Courses
- PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
- PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6081 - Sex, Sexuality, and Sexual Health (2.0 cr)
- PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6242 - Cultural Humility with American Indian Populations (2.0 cr)
- PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
### Applied Practice Experience (1 credits)
Take at least 1 credit, in consultation with the advisor:
- PUBH 7096 - Applied Practice Experience: Community Health Promotion (1.0 - 5.0 cr)

### Integrated Learning Experience (1 credit)
Take at least 1 credit, in consultation with the advisor:
- PUBH 7094 - Integrative Learning Experience: Community Health Promotion (1.0 - 6.0 cr)

### Electives
Select electives, in consultation with the advisor, to complete the 48-credit requirement.
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- CSPH 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)
- CSPH 5305 - Introduction to Integrative Mental Health (2.0 cr)
- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
- CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
- CSPH 5704 - Business of Health Coaching (2.0 cr)
- CSPH 5706 - Lifestyle Medicine (2.0 cr)
- CSPH 5707 - Coaching People with Clinical Conditions (2.0 cr)
- CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
- CSPH 5709 - Health and Wellbeing Group Coaching (2.0 cr)
- CSPH 5713 - Health Coaching for Health Professionals (2.0 cr)
- CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
- CSPH 5905 - Food Matters: Cook Like Your Life Depends On It (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- FSCN 4612W - Advanced Human Nutrition [WI] (4.0 cr)
- FSCN 4614W - Community Nutrition [SOCS, DSJ, WI] (3.0 cr)
- FSCN 4621 - Nutrition and Metabolism (4.0 cr)
- FSCN 4622 - Nutritional Toxicology, the basic science of diet-related toxicants (3.0 cr)
- FSCN 4665 - Medical Nutrition Therapy I (3.0 cr)
- FSCN 4666 - Medical Nutrition Therapy II (3.0 cr)
- FSCN 4732 - Food and Nutrition Management (3.0 cr)
- FSCN 5131 - Food Quality for Graduate Credit (3.0 cr)
- FSCN 5312 - Food Analysis (4.0 cr)
- FSCN 5501 - Management of Eating Disorders (3.0 cr)
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 5111 - Introduction to Family Therapy (3.0 cr)
- FSOS 5701 - Prevention Science: Principles and Practices (3.0 cr)
- FSOS 5937 - Parent-Child Interaction (3.0 cr)
- FSOS 5942 - Diverse Family Experiences (3.0 cr)
- FSOS 5944 - Curricular Design in Parent Education (3.0 cr)
- FSOS 5945 - Teaching and Learning in Parent Education (3.0 cr)
- FSOS 5946 - Assessment and Evaluation in Parent Education (3.0 cr)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8002 - Advanced Family Conceptual Frameworks (3.0 cr)
- FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
- FSOS 8036 - Couple/Marriage and Family Therapy Research (3.0 cr)
- FSOS 8011 - Family Stress, Coping, and Adaptation (3.0 cr)
- HINF 5430 - Foundations of Health Informatics I (3.0 cr)
- HINF 5431 - Foundations of Health Informatics II (3.0 cr)
- HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
- HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
- HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HINF 5520</td>
<td>Informatics Methods for Health Care Quality, Outcomes, and Patient Safety</td>
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<tr>
<td>HINF 5531</td>
<td>Health Data Analytics and Data Science</td>
<td>3.0 cr</td>
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<tr>
<td>HINF 5610</td>
<td>Foundations of Biomedical Natural Language Processing</td>
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<td>HINF 5620</td>
<td>Data Visualization for the Health Sciences</td>
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<td>HINF 5630</td>
<td>Clinical Data Mining</td>
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<td>Foundations of Human Sexuality</td>
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<td>Policy in Human Sexuality: Cutting Edge Analyses</td>
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<td>HSEX 6013</td>
<td>Perspectives and Practices in Sexual Health Education</td>
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<td>LAW 6036</td>
<td>Reproductive Rights</td>
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PA 5043 - Economic and Demographic Data Analysis (2.0 cr)
PA 5044 - Applied Regression, Accelerated (2.0 cr)
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PA 5053 - Policy Analysis in Public Affairs (2.0 cr)
PA 5054 - Program Design and Implementation Analysis (2.0 cr)
PA 5055 - Qualitative Research Methods and Analysis (2.0 cr)
PA 5056 - Quantitative Research Methods and Analysis (2.0 cr)
PA 5081 - Understanding Power and Teamwork in Public Affairs Education (0.5 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5103 - Leadership and Change (1.5 - 3.0 cr)
PA 5104 - Strategic Human Resource Management (3.0 cr)
PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
PA 5113 - State and Local Public Finance (3.0 cr)
PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
PA 5116 - Financing Public and Nonprofit Organizations (1.5 cr)
PA 5122 - Law and Public Affairs (3.0 cr)
PA 5123 - Philanthropy in America: History, Practice, and Trends (1.5 - 3.0 cr)
PA 5135 - Managing Conflict: Negotiation (3.0 cr)
PA 5136 - Group Process Facilitation for Organizational and Public/Community Engagement (1.0 cr)
PA 5137 - Project Management in the Public Arena (1.5 cr)
PA 5145 - Civic Participation in Public Affairs (3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
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PA 5211 - Land Use Planning (3.0 cr)
PA 5212 - Managing Urban Growth and Change (3.0 cr)
PA 5213 - Introduction to Site Planning (3.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5251 - Strategic Planning and Management (3.0 cr)
PA 5261 - Housing Policy (3.0 cr)
PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)
PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
PA 5405 - Public Policy Implementation (3.0 cr)
PA 5413 - Early Childhood and Public Policy (1.5 - 3.0 cr)
PA 5415 - Effective Policies for Children in the First Decade (1.5 - 3.0 cr)
PA 5421 - Racial Inequality and Public Policy (3.0 cr)
PA 5426 - Community-Engaged Research and Policy with Marginalized Groups (3.0 cr)
PA 5431 - Public Policies on Work and Pay (3.0 cr)
PA 5451 - [Inactive](3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)
PA 5561 - Gender and International Development (3.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5723 - Water Policy (3.0 cr)
PA 5724 - Climate Change Policy (3.0 cr)
PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5805 - Global Economics (3.0 cr)
PA 5813 - US Foreign Policy: Issues and Institutions (3.0 cr)
PA 5814 - Global Diplomacy in a Time of Change (3.0 cr)
PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
PA 5825 - Crisis Management in Foreign Affairs (1.5 cr)
PA 5826 - National Security Policy (3.0 cr)
PA 5885 - Human Rights Policy: Issues and Actors (3.0 cr)
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<td>Adolescent Health: Issues, Programs, and Policies</td>
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PUBH 6904 - Nutrition and Aging (2.0 cr)
PUBH 6906 - Global Nutrition (2.0 cr)
PUBH 6907 - Maternal, Infant, Child and Adolescent Nutrition (3.0 cr)
PUBH 6914 - Community Nutrition Intervention (3.0 cr)
PUBH 6915 - Nutrition Assessment (2.0 cr)
PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
PUBH 6954 - Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations (2.0 cr)
PUBH 6955 - Using Policy to Address the Weight-Related Health of Child and Adolescent Populations (1.0 cr)
PUBH 6995 - Community Nutrition Practicum (7.0 cr)
PUBH 6996 - Clinical Nutrition Practicum (7.0 cr)
PUBH 7091 - Independent Study: Community Health Promotion (1.0 - 4.0 cr)
PUBH 7193 - Directed Study: Environmental Health (1.0 - 4.0 cr)
PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
PUBH 7210 - Topics: Global Food Systems (0.5 cr)
PUBH 7214 - Principles of Risk Communication (1.0 cr)
PUBH 7221 - Planning for Urgent Threats (1.0 cr)
PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)
PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
PUBH 7235 - Surveillance of Zoonotic Pathogens in Animals (1.0 cr)
PUBH 7242 - War and Public Health (1.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7253 - Introduction to GIS (1.0 cr)
PUBH 7257 - Qualitative Data Analysis (1.0 cr)
PUBH 7262 - Globalization and Health (1.0 cr)
PUBH 7391 - Independent Study: Epidemiology (1.0 - 4.0 cr)
PUBH 7392 - Readings in Epidemiology (1.0 - 4.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7465 - Biostatistics Consulting (2.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7485 - Methods for Causal Inference (3.0 cr)
PUBH 7534 - Marketing for Health Care Professionals (1.0 cr)
PUBH 7537 - Healthcare Finance (3.0 cr)
PUBH 7542 - Quality Improvement and Patient Safety (2.0 cr)
PUBH 7547 - Health Care Human Resource Management (2.0 cr)
PUBH 7551 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 7553 - Health Care Management Ethics (1.0 cr)
PUBH 7554 - Health Care Strategy and Marketing (3.0 cr)
PUBH 7555 - Health Economics (2.0 cr)
PUBH 7556 - Health and Health Systems (2.0 cr)
PUBH 7560 - Operations Research and Quality in Health Care (3.0 cr)
PUBH 7562 - Information Technology in Health Care (2.0 cr)
PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 7569 - Health Care Policy (1.0 cr)
PUBH 7570 - Topics: Healthcare Administration (1.0 cr)
PUBH 7576 - Legal Considerations in Health Services Organizations (2.0 cr)
PUBH 7590 - Gerontology for Healthcare Managers (1.0 cr)
PUBH 7591 - Independent Study: Health Care Administration (1.0 - 4.0 cr)
PUBH 7691 - Independent Study: Maternal and Child Health (1.0 - 4.0 cr)
PUBH 7720 - Data to Drive Public Health (2.0 cr)
PUBH 7730 - Public Health Laws, Rules, and Regulations (1.0 cr)
PUBH 7791 - Independent Study: Public Health Administration and Policy (1.0 - 6.0 cr)
PUBH 7991 - Independent Study: Public Health Nutrition (1.0 - 4.0 cr)
PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)
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<td>PUBH 8166</td>
<td>Experiences in Toxicology Research</td>
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<td>International and Comparative Social Welfare Policy (3.0 cr)</td>
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<td>VMED 8344</td>
<td>Ethical Conduct of Animal Research (3.0 cr)</td>
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a total of 12 credits in common among the academic programs.
Twin Cities Campus
Environmental Health M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42 to 52
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master's and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

The School of Public Health (SPH) and College of Biological Sciences (CBS) offer early-admission opportunities for eligible University CBS students interested in completing the MPH Environmental Health degree. Interested CBS students should contact their college office or the SPH for more information.

Accreditation
This program is accredited by Council on Education for Public Health

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum qualifications include a baccalaureate degree with coursework in the basic sciences. Occupational health nursing/medicine applicants must have a relevant degree from an accredited school.

Other requirements to be completed before admission:
Applicants to the Industrial Hygiene sub-plan must meet the following additional criteria: a good undergraduate academic record in a relevant discipline (preferably science or engineering), with a minimum level of coursework in biology, chemistry (including organic), physics, and mathematics (including calculus). Students with undergraduate non-science fields, with appropriate additional coursework or work experience, may also apply, but must demonstrate strengths in physics, chemistry (including organic), biology, and mathematics (including calculus) and complementary non-science coursework (e.g. social sciences, languages). Strong letters of recommendation and a written statement that reflects a clear motivation toward occupational and environmental health. Success in prior industrial hygiene-related work is a strong factor for admission to this track. Applicants interested in the Environmental Infectious Diseases emphasis: microbiology background is preferred.

Applicants must submit their test score(s) from the following:
- MCAT
  - Verbal Reasoning score: 10
• Physical Science score: 10
• Biological Reasoning score: 10
• Writing Sample score: 10

• LSAT
  - Law School Admission Test (LSAT) score: 140

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 80

Key to test abbreviations (MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 42 to 52 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Students complete PUBH 7194 (Integrative Learning Experience) in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with advisor approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Public Health Core Requirements (16 credits)
Take the following courses for a total of 9 credits. A minimum grade of B- is required for each course.
- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Epidemiology Requirement (3 credits)
Take one of the following courses. A minimum grade of B- is required.
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Biostatistics Requirement (4 credits)
Select PUBH 6450 or PUBH 6414 in consultation with the advisor. Students taking electives from the Industrial Hygiene track must take PUBH 6450. Students who take PUBH 6414 must take at least one additional credit from the biostatistical program course list to complete the 4-credit requirement. A minimum grade of B- is required.
- PUBH 6450 - Biostatistics I (4.0 cr)
  or
- PUBH 6414 - Biostatistical Literacy (3.0 cr)

Biostatistical Programming Options
- Students who take PUBH 6414 must select one of the following courses in consultation with the advisor to complete the biostatistics programming requirement. A minimum grade of B- is required.
  - PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
  - PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
  - PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
  - PUBH 6420 - Introduction to SAS Programming (1.0 cr)
  - PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
  - PUBH 6813 - Managing Electronic Health Information (2.0 cr)
  - PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
  - PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
  - PUBH 7264 - Data Visualization in R (1.0 cr)

Applied Practice Experience (1 to 3 credits)
Take the following course in consultation with the advisor. Students pursuing the Industrial Hygiene track must take PUBH 7196 for 3
credits. All other students take the course for 1 credit.
PUBH 7196 - Applied Practice Experience: Environmental Health (1.0 - 5.0 cr)

Integrative Learning Experience (1 to 3 credits)
Take the following course in consultation with the advisor. Students pursuing the Industrial Hygiene track must take PUBH 7194 for 3 credits. All other students take the course for 1 credit.
PUBH 7194 - Integrative Learning Experience: Environmental Health (1.0 - 5.0 cr)

Emphasis Areas

Generalist (24 credits)
Students pursue and develop their particular interests to complete the Generalist emphasis.

Coursework
Select credits from the following, in consultation with the advisor, to complete the 42-credit minimum. Other courses can be chosen with approval of the advisor and program director. A minimum grade of B- is required for each course.
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6601 - Born a Girl: Global Women's Health (1.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
PUBH 6034 - Evaluation I: Concepts (3.0 cr)
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6527 - Healthcare Leadership and Effecting Change (2.0 cr)
PA 5451 (Inactive)(3.0 cr)
PUBH 6906 - Global Nutrition (2.0 cr)
PUBH 6730 - International Comparative Health Systems (2.0 cr)
PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6160 - Principles of Toxicology II (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6035 - Evaluation II: Applications (3.0 cr)
PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
PUBH 6350 - Motivational Interviewing: Strategies to Effect Behavior Change (1.0 cr)
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6344 - Completing the Integrated Learning Experience: Secondary Data Analysis (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)
PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6431 - Topics in Hierarchical Bayesian Analysis (1.0 cr)
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 6542 - Management of Health Care Organizations (3.0 cr)
PUBH 6544 - Principles of Problem Solving in Health Services Organizations (3.0 cr)
PUBH 6547 - Health Care Human Resources Management (2.0 cr)
PUBH 6555 - Health Economics (2.0 cr)
PUBH 6556 - Health and Health Systems (3.0 cr)
PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
PUBH 6562 - Information Technology in Health Care (2.0 cr)
PUBH 6563 - Integrated Delivery Systems (2.0 cr)
PUBH 6564 - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
PUBH 6571 - Quality, Patient Safety, and Performance Improvement (2.0 cr)
PUBH 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
PUBH 6596 - Legal Considerations in Health Services Organizations (2.0 cr)
PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)
PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
PUBH 6711 - Public Health Law (2.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 7214 - Principles of Risk Communication (1.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 7222 - Best Practices in Emergency Response (1.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 6801 - Foundations of Public Health Nutrition Leadership (2.0 cr)
PUBH 6820 - Foundations of Interprofessional Professional Communication and Collaboration (1.0 cr)
PUBH 7210 - Topics: Global Food Systems (0.5 cr)
PUBH 6730 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7253 - Introduction to GIS (1.0 cr)
PUBH 7257 - Qualitative Data Analysis (1.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7534 - Marketing for Health Care Professionals (1.0 cr)
PUBH 7541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 7558 - Health and Health Systems (2.0 cr)
PUBH 7562 - Information Technology in Health Care (2.0 cr)
PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 7568 - Interdisciplinary Teamwork in Health Care (2.0 cr)
PUBH 7569 - Health Care Policy (1.0 cr)
PUBH 6154 - Climate Change and Global Health (3.0 cr)
PUBH 6184 - Field and laboratory methods in public health entomology (2.0 cr)
PUBH 6110 - Foodborne Hazards (2.0 cr)

-OR-

Occupational and Environmental Health Nursing (24 credits)

Required Coursework (9 credits)
Take the following courses. A minimum grade of B- is required for each course.
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6151 - Occupational and Environmental Health Nursing Seminar (1.0 cr)

Electives
Select credits from the following, in consultation with the advisor, to complete the 42-credit minimum. Other courses can be chosen with approval of the advisor and program director. A minimum grade of B- is required for each course.
PA 5451 (Inactive) (3.0 cr)
PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
PUBH 6034 - Evaluation I: Concepts (3.0 cr)
PUBH 6035 - Evaluation II: Applications (3.0 cr)
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6060 - Motivational Interviewing: Strategies to Effect Behavior Change (1.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)

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Information current as of November 07, 2022
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<th>Course Code</th>
<th>Course Title</th>
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PUBH 7534 - Marketing for Health Care Professionals (1.0 cr)
PUBH 7541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 7556 - Health and Health Systems (2.0 cr)
PUBH 7562 - Information Technology in Health Care (2.0 cr)
PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 7568 - Interdisciplinary Teamwork in Health Care (2.0 cr)
PUBH 7569 - Health Care Policy (1.0 cr)

-OR-

Occupational and Environmental Medicine (24 credits)

Required Coursework (19 credits)

Take the following courses. A minimum grade of B- is required for each course.

PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6159 - Principles of Toxicology I (2.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)

Electives

Select credits from the following, in consultation with the advisor, to complete the 42-credit minimum. Other courses can be chosen with approval of the advisor and program director. A minimum grade of B- is required for each course.

PA 5451 [Inactive] (3.0 cr)
PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
PUBH 6034 - Evaluation I: Concepts (3.0 cr)
PUBH 6035 - Evaluation II: Applications (3.0 cr)
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6060 - Motivational Interviewing: Strategies to Effect Behavior Change (1.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6160 - Principles of Toxicology II (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6344 - Completing the Integrated Learning Experience: Secondary Data Analysis (2.0 cr)
PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6431 - Topics in Hierarchical Bayesian Analysis (1.0 cr)
PUBH 6527 - Healthcare Leadership and Effecting Change (2.0 cr)
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 6542 - Management of Health Care Organizations (3.0 cr)
PUBH 6544 - Principles of Problem Solving in Health Services Organizations (3.0 cr)
PUBH 6547 - Health Care Human Resources Management (2.0 cr)
PUBH 6551 - Health Economics (2.0 cr)
PUBH 6556 - Health and Health Systems (3.0 cr)
PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
PUBH 6562 - Information Technology in Health Care (2.0 cr)
PUBH 6563 - Integrated Delivery Systems (2.0 cr)
PUBH 6564 - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
PUBH 6571 - Quality, Patient Safety, and Performance Improvement (2.0 cr)
PUBH 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
PUBH 6596 - Legal Considerations in Health Services Organizations (2.0 cr)
PUBH 6601 - Born a Girl: Global Women's Health (1.0 cr)

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PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)
PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
PUBH 6711 - Public Health Law (2.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6730 - International Comparative Health Systems (2.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
PUBH 6817 - Decision Analysis for Health Care (2.0 cr)
PUBH 6818 - Survey Research Methods (3.0 cr)
PUBH 6819 - Community-based Participatory Research (2.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 6901 - Foundations of Public Health Nutrition Leadership (2.0 cr)
PUBH 6905 - Global Nutrition (2.0 cr)
PUBH 6920 - Foundations of Interprofessional Professional Communication and Collaboration (1.0 cr)
PUBH 7210 - Topics: Global Food Systems (0.5 cr)
PUBH 7214 - Principles of Risk Communication (1.0 cr)
PUBH 7222 - Best Practices in Emergency Response (1.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7253 - Introduction to GIS (1.0 cr)
PUBH 7257 - Qualitative Data Analysis (1.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7534 - Marketing for Health Care Professionals (1.0 cr)
PUBH 7541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 7556 - Health and Health Systems (2.0 cr)
PUBH 7562 - Information Technology in Health Care (2.0 cr)
PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 7568 - Interdisciplinary Teamwork in Health Care (2.0 cr)
PUBH 7569 - Health Care Policy (1.0 cr)

Joint- or Dual-degree Coursework: MPH-Environmental Health/JD
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Industrial Hygiene
The Industrial Hygiene (IH) sub-plan, accredited by the Applied Science Accreditation Commission of ABET, focuses on the health and safety of people at work and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment. This sub-plan prepares well-qualified practitioners and researchers for an exciting career in industry, government organizations, and academic and research institutions.

Industrial Hygiene Requirements (23 credits)
Take the following courses. A minimum grade of B- is required for each course.
PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
PUBH 6174 - Control of Workplace Exposure (3.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6159 - Principles of Toxicology I (2.0 cr)

Electives
Select credits from the following, in consultation with the advisor, to complete the 52-credit minimum. Other courses can be chosen with approval of the advisor and program director. A minimum grade of B- is required for each course.
PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6161 - Regulatory Toxicology (2.0 cr)
PUBH 6177 - Nanotechnology Health and Safety (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5513 - Engineering Safety (4.0 cr)
KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)
PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)
CMGT 4031 - Construction Safety and Loss Control (3.0 cr)
PUBH 6115 - Worker Protection Law (1.0 cr)

Integrated BS-Biochemistry/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Biochemistry BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Biochemistry/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Biochemistry/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Biology/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Biology BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Biology/MPH Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Biology/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Cellular and Organismal Physiology/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Cellular and Organismal Physiology BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Cellular and Organismal Physiology/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely
degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Cellular and Organismal Physiology/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Ecology, Evolution and Behavior/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Ecology, Evolution and Behavior BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Ecology, Evolution and Behavior/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Ecology, Evolution and Behavior/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Genetics, Cell Biology and Development/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Genetics, Cell Biology and Development BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Genetics, Cell Biology and Development MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Genetics, Cell Biology and Development/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Microbiology/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Microbiology BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Microbiology/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Microbiology/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Neuroscience/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Neuroscience BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Neuroscience/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Neuroscience/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Plant and Microbial Biology/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Plant and Microbial Biology BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Plant and Microbial Biology/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Plant and Microbial Biology/MPH-Environmental Health opportunity is the spring of the applicant's junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.
The School of Public Health (SPH) and the College of Biological Sciences (CBS) offer an early-admission opportunity for eligible Plant and Microbial Biology BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-Plant and Microbial Biology/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-Plant and Microbial Biology/MPH-Environmental Health opportunity is the spring of the applicant’s junior (third) year. Confer with the CBS advising office and the School of Public Health for application instructions.

Integrated BS-Health Science-UMR/MPH-Environmental Health
This sub-plan is limited to students completing the program under Plan C.

The School of Public Health (SPH) and the University of Minnesota - Rochester (UMR) offer an early-admission opportunity for eligible Health Science BS students interested in pursuing the Environmental Health MPH degree. Students admitted to the Integrated BS-UMR/MPH-Environmental Health sub-plan take 12 MPH credits during their senior (fourth) year, and complete the MPH by taking remaining credits as a full-time graduate student their fifth year and following summer. Graduate courses cannot be applied toward both BS and MPH credit and degree requirements. Admitted students must maintain timely degree progress to ensure that the BS degree is awarded no later than the end of the senior (fourth) year. The application deadline for the Integrated BS-UMR/MPH-Environmental Health opportunity is the spring of the applicant’s junior (third) year. Confer with the UMR advising office and the School of Public Health for application instructions.
Environmental Health M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 30 to 52
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. Environmental Health at the University of Minnesota offers master's and doctoral degrees, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. Students are prepared to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

The MS program offers a generalist concentration, and environmental chemistry concentration, and a specialized track in industrial hygiene. The Industrial Hygiene track is accredited by ABET.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum requirements include a baccalaureate degree with coursework in the basic sciences.

Other requirements to be completed before admission:
The Industrial Hygiene track requires additional preparation. For more information, refer to https://www.sph.umn.edu/academics/divisions/enhs/degrees/hygiene/admissions/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 to 52 major credits and 0 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is a master's capstone project selected in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Public Health Core Requirements (11-12 credits)
All Public Health Core coursework must be taken on the A-F grade basis, with a minimum grade of B- earned for each course.

Epidemiology (3 credits)
Students pursuing the Industrial Hygiene track must take PUBH 6320. All other students select one of the following courses in consultation with the advisor.

PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Environmental Health (2 credits)
Take the following course:
PUBH 6102 - Issues in Environmental Health (2.0 cr)

Foundations of Public Health (2 credits)
Take the following course:
PUBH 6250 - Foundations of Public Health (2.0 cr)

Biostatistics (3-4 credits)
Industrial Hygiene track students must take PUBH 6450. All other students select one of the following courses in consultation with their advisor. Students pursuing the Environmental Chemistry emphasis are encouraged to take STAT 5021.

PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Ethics (1 credit)
Take the following course:
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Plan Options

Plan A Thesis (10 credits)
Plan A students must take at least 10 master's thesis credits.
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B Project (3 credits)
Plan B students must take at least 3 Plan B Project credits in consultation with the advisor.
PUBH 7195 - MS in Environmental Health Sciences Plan B Project (1.0 - 5.0 cr)

Concentration Areas

Generalist Concentration
The Generalist concentration is restricted to Plan B only.

Electives
Select electives, in consultation with the advisor, from the following to satisfy the 30-credit minimum. Other courses may be substituted with approval of the advisor and director of graduate studies.
PA 5451 [Inactive] (3.0 cr)
PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
PUBH 6034 - Evaluation I: Concepts (3.0 cr)
PUBH 6035 - Evaluation II: Applications (3.0 cr)
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
Environmental Chemistry Concentration

The Environmental Chemistry concentration offers Plan A and Plan B options.

Required Coursework (9 credits)

- Take the following courses.
  - CEGE 5541 - Environmental Water Chemistry (3.0 cr)
  - EEB 5601 - Limnology (3.0 cr)
  - PUBH 6190 - Environmental Chemistry (3.0 cr)

Electives (6 credits)

- Plan B students select 6 credits from the following, in consultation with the advisor, to complete the 30-credit minimum.
  - CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
  - CEGE 8503 - Environmental Mass Transport (4.0 cr)
  - CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
  - CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Industrial Hygiene

The Environmental Health MS with the Industrial Hygiene (IH) track is a 52-credit program that focuses on the recognition, evaluation, and control of potential workplace hazards -- including chemical, physical, and biological agents -- and the potential health threats to the community and the environment.


The Industrial Hygiene track is restricted to Plan B only.
Industrial Hygiene Required Courses (23 credits)
Take the following courses:
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6174 - Control of Workplace Exposure (3.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
PUBH 6159 - Principles of Toxicology I (2.0 cr)

Applied Practice Experience (3 credits)
Take the following course in consultation with the advisor.
PUBH 7196 - Applied Practice Experience: Environmental Health (1.0 - 5.0 cr)

Electives
Select electives from the following list, in consultation with the advisor, to complete the 52-credit minimum. Other courses may be substituted with approval of the advisor and director of graduate studies.
PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)
PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6161 - Regulatory Toxicology (2.0 cr)
PUBH 6177 - Nanotechnology Health and Safety (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
CEGE 5551 - Environmental Microbiology (3.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5513 - Engineering Safety (4.0 cr)
KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
CMGT 4031 - Construction Safety and Loss Control (3.0 cr)
Twin Cities Campus
Environmental Health Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The environmental health minor is designed for students who wish to understand how our physical and social environment affects public health. Students will learn about exposure to physical and social stressors, such as chemicals, infectious agents, stress, and violence; how stressors affect health; and how decisions are made to protect health.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Students enrolled in University master's or doctoral programs are eligible for the minor.

Other requirements to be completed before admission:
Prior consultation with the major field academic advisor regarding pursuit of the Environmental Health minor is expected. For more information regarding the Environmental Health minor, contact ehnsss@umn.edu.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses offered on both the A-F and S/N grade basis must be taken A-F. A minimum grade of B- is required for all courses.

The minimum cumulative GPA for the minor is 3.00.

Coursework (6-12 credits)
Required Course (2 credits)
Take the following course.
PUBH 6102 - Issues in Environmental Health (2.0 cr)

Electives
Master's students must select 4 credits from the following list and doctoral students must select 10 credits, in consultation with the Environmental Health director of graduate studies.

PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Environmental Health Ph.D.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 49 to 80
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master's and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree with coursework in the basic sciences. Each specialty requires slightly different preparation.

Other requirements to be completed before admission:
Applicants to the Industrial Hygiene track must meet the following additional criteria:
For students with undergraduate degrees in a relevant discipline, good academic performance (preferably science or engineering, but other disciplines will be considered), and a minimum level of coursework in biology, chemistry (including organic), physics, and mathematics (including calculus) are required. Students with undergraduate degrees in non-science fields with appropriate additional coursework and work experience may also apply, but must demonstrate strengths in physics, chemistry (including organic), biology, and mathematics (including calculus); complementary courses in non-science disciplines (e.g., social sciences, languages) that reflect a well-rounded education; a clear motivation toward occupational and environmental health as articulated by the written statement, and strong letters of recommendation. Success in prior industrial hygiene-related work is preferred.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
25 to 56 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Core Coursework (4 credits)
Take the following courses on the A-F grading basis. A minimum grade of B- must be earned for each course.
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)

Thesis Credits (24 credits)
Take at least 24 doctoral thesis credits.
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Concentration Areas

Environmental Chemistry (22 credits)
Required Coursework (17 credits)
Take the following courses:
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)

Electives (5 credits)
Choose electives in consultation with the advisor.
- CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
- CEGE 8503 - Environmental Mass Transport (4.0 cr)
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)

Environmental and Occupational Epidemiology (27 credits)
Required Coursework (16 credits)
Take the following courses. Take 4 credits of PUBH 8120.
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)
- PUBH 8340 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
- PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
- PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)

Electives (11 credits)
Choose electives in consultation with the advisor.
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7460 - Advanced Statistical Computing (3.0 cr)
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)

-OR-

Environmental Infectious Diseases (30 credits)

Required Coursework
Take the following courses for a total of 12 credits:
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)

Epidemiology (10 credits)
Take the following courses:
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)

Biostatistics (8 credits)
Take the following courses:
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

-OR-

Occupational and Environmental Health Nursing (35 credits)

Required Coursework
Take the following courses. Take 2 credits of PUBH 8120.
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)

-OR-

Environmental Toxicology (21 credits)

Required Coursework (20 credits)
Take the following courses:
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6159 - Principles of Toxicology I (2.0 cr)
PUBH 6160 - Principles of Toxicology II (3.0 cr)
PUBH 6161 - Regulatory Toxicology (2.0 cr)

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Information current as of November 07, 2022
PUBH 8160 - Advanced Toxicology (2.0 cr)
PUBH 8161 - Current Literature in Toxicology (1.0 cr)

Electives (1 credit)
Select one of the following courses, in consultation with the advisor, to complete the 21-credit minimum for this concentration.
ANSC 8344 - Mechanisms of Hormone Action (2.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8102 - Practicum for Future Faculty (3.0 cr)

-OR-

Occupational Injury Prevention Research Training (52 credits)

Required Coursework
Take the following courses. Take 4 credits of PUBH 8120.

PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)

-OR-

Food Safety (33 credits)
Take the following courses. Take PUBH 7210 twice for a total of 1 credit.
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 6183 - Theory and Practice in Foodborne Disease Outbreak Detection, Investigation and Control (1.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 7210 - Topics: Global Food Systems (0.5 cr)
FSCN 5131 - Food Quality for Graduate Credit (3.0 cr)
PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)

Epidemiology (10 credits)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)

Biostatistics (8 credits)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Industrial Hygiene
The Industrial Hygiene track focuses on the health and safety of people at work, the community at large, and the environment. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents.
Industrial Hygiene Requirements (23 credits)

Take the following courses. Students with an ABET-accredited masters can apply up to 6 credits from that degree, with advisor approval, toward the 23-credit requirement.

Take the following courses:
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6174 - Control of Workplace Exposure (3.0 cr)
- PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
- PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
- PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
- PUBH 6159 - Principles of Toxicology I (2.0 cr)
Twin Cities Campus
Epidemiology M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42 to 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The epidemiology (EPI) MPH program trains students to: analyze public health trends in the burden of disease, identify risk factors for disease, design and implement studies, and interpret results for disease prevention and control policies and programs.

Two tracks are available to students in the Epidemiology MPH program: Standard Program or Accelerated Program. Students in the Standard Program are required to complete a minimum of 48 credits. Students in the Accelerated Program complete a 42 credit minimum curriculum and is available to those who have a prior earned doctoral degree.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree, with coursework in the basic sciences, from an accredited institution.

Admission to the accelerated program requires an earned doctorate (e.g., MD, PhD, DVM, DC, DDS), in a related field, from an accredited institution.

Other requirements to be completed before admission:
For more information visit www.sph.umn.edu

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 42 to 48 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone project comprises an integrative learning experience. Students complete either PUBH 7394 or PUBH 6344, selected in consultation with the advisor, to meet this requirement.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Public Health Core Requirements (14 credits)
A minimum grade of B- must be earned for each of the following PUBH core courses:
- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Epidemiology Core Requirements (11 credits)
Take the following courses. Select PUBH 6325 or PUBH 6420 in consultation with the advisor. All courses must be completed A-F, with a minimum grade of B-.
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
- PUBH 6365 - Global Challenges in Infectious Disease Epidemiology (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
  or PUBH 6420 - Introduction to SAS Programming (1.0 cr)

Epidemiology Content Courses (2 credits)
Select at least 1 course from the following, in consultation with the advisor. All courses must be completed A-F with a minimum grade of B-.
- PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)

Biostatistics (4 credits)
A minimum grade of B- must be earned for the following course:
- PUBH 6451 - Biostatistics II (4.0 cr)

Basic Science Requirement (4 credits)
PUBH 6355 is not required for students in the accelerated program, or for standard-program students who obtain prior approval from the program director and course instructor.
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)

Applied Practice Experience (1-2 credits)
Take 1-2 credits of PUBH 7396, in consultation with the advisor.
- PUBH 7396 - Applied Practice Experience: Epidemiology (1.0 - 5.0 cr)

Integrated Learning Experience (2 credits)
Take 1 of the following courses, in consultation with the advisor. If PUBH 7394 is selected, take at least 2 credits.
- PUBH 7394 - Integrative Learning Experience: Epidemiology (1.0 - 6.0 cr)
  or PUBH 6444 - Completing the Integrated Learning Experience: Secondary Data Analysis (2.0 cr)

Electives (8-10 credits)
Students pursuing the standard program select at least 10 elective credits, and students pursuing the accelerated program select at least 8 elective credits in consultation with the advisor.
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
CSPH 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)
CSPH 5305 - Introduction to Integrative Mental Health (2.0 cr)
CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
CSPH 5704 - Business of Health Coaching (2.0 cr)
CSPH 5706 - Lifestyle Medicine (2.0 cr)
CSPH 5707 - Coaching People with Clinical Conditions (2.0 cr)
CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
CSPH 5709 - Health and Wellbeing Group Coaching (2.0 cr)
CSPH 5713 - Health Coaching for Health Professionals (2.0 cr)
CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
CSPH 5807 - Wellbeing in the Workplace: Pause, Practice, Perform (2.0 cr)
CSPH 5905 - Food Matters: Cook Like Your Life Depends On It (1.0 cr)
EPSY 5114 - Psychology of Student Learning (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
FSCN 4612W - Advanced Human Nutrition [WI] (4.0 cr)
FSCN 4614W - Community Nutrition [SOCS, DSJ, WI] (3.0 cr)
FSCN 6221 - Nutrition and Metabolism (4.0 cr)
FSCN 6222 - Nutritional Toxicology, the basic science of diet-related toxicants (3.0 cr)
FSCN 4665 - Medical Nutrition Therapy I (3.0 cr)
FSCN 4666 - Medical Nutrition Therapy II (3.0 cr)
FSCN 4732 - Food and Nutrition Management (3.0 cr)
FSCN 5312 - Food Analysis (4.0 cr)
FSCN 5601 - Management of Eating Disorders (3.0 cr)
FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
FSOS 5015 - Family Research Laboratory (1.0 cr)
FSOS 5111 - Introduction to Family Therapy (3.0 cr)
FSOS 5701 - Prevention Science: Principles and Practices (3.0 cr)
FSOS 5937 - Parent-Child Interaction (3.0 cr)
FSOS 5942 - Diverse Family Experiences (3.0 cr)
FSOS 5944 - Curricular Design in Parent Education (3.0 cr)
FSOS 5945 - Teaching and Learning in Parent Education (3.0 cr)
FSOS 5946 - Assessment and Evaluation in Parent Education (3.0 cr)
FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
FSOS 8002 - Advanced Family Conceptual Frameworks (3.0 cr)
FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
FSOS 8030 - Couple/Marriage and Family Therapy Research (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5511 - Health Data Analytics and Data Science (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5630 - Clinical Data Mining (3.0 cr)
HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
HSEX 6211 - Dimensions of Sexual Functioning (3.0 cr)
HSEX 6013 - Perspectives and Practices in Sexual Health Education (3.0 cr)
LAW 6036 - Reproductive Rights (3.0 cr)
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<td>PA 5601</td>
<td>Global Survey of Gender and Public Policy</td>
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<td>Science, Technology &amp; Environmental Policy</td>
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<td>Energy Systems and Policy</td>
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<td>PA 5741</td>
<td>Risk, Resilience and Decision Making</td>
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<td>Global Public Policy</td>
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<td>PA 5805</td>
<td>Global Economics</td>
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<td>PA 5813</td>
<td>US Foreign Policy: Issues and Institutions</td>
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<td>PA 5814</td>
<td>Global Diplomacy in a Time of Change</td>
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<td>PA 5823</td>
<td>Human Rights and Humanitarian Crises: Policy Challenges</td>
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<td>PA 5826</td>
<td>National Security Policy</td>
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<td>PA 5885</td>
<td>Human Rights Policy: Issues and Actors</td>
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<td>PA 5927</td>
<td>Effective Grantwriting for Nonprofit Organizations</td>
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<td>PA 5928</td>
<td>Data Management and Visualization with R</td>
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<td>PA 5929</td>
<td>Data Visualization: Telling Stories with Numbers</td>
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<td>PA 5933</td>
<td>Survey Methods: Designing Effective Questionnaires</td>
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<td>PUBH 5231</td>
<td>Emergency Preparedness: A Public Health Perspective</td>
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<td>PUBH 6004</td>
<td>Global Health Capstone</td>
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<td>PUBH 6011</td>
<td>Public Health Approaches to HIV/AIDS</td>
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<tr>
<td>PUBH 6020</td>
<td>Fundamentals of Social and Behavioral Science</td>
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<td>PUBH 6034</td>
<td>Evaluation I: Concepts</td>
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PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6525 - Introduction to Population Health: A Health System (2.0 cr)
PUBH 6535 - Managerial Accounting for Health Services (3.0 cr)
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 6542 - Management of Health Care Organizations (3.0 cr)
PUBH 6544 - Principles of Problem Solving in Health Services Organizations (3.0 cr)
PUBH 6553 - Health Care Management Ethics (1.0 cr)
PUBH 6554 - Healthcare Strategy and Marketing (2.0 cr)
PUBH 6555 - Health Economics (2.0 cr)
PUBH 6556 - Health and Health Systems (3.0 cr)
PUBH 6558 - Health Finance II (3.0 cr)
PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
PUBH 6562 - Information Technology in Health Care (2.0 cr)
PUBH 6564 - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
PUBH 6570 - Healthcare Administration (1.0 - 4.0 cr)
PUBH 6571 - Quality, Patient Safety, and Performance Improvement (2.0 cr)
PUBH 6576 - Understanding Clinical Quality Using Administrative Data (2.0 cr)
PUBH 6577 - Advanced Problem Solving in Health Services Administration (2.0 cr)
PUBH 6578 - Negotiation Strategies (2.0 cr)
PUBH 6596 - Legal Considerations in Health Services Organizations (2.0 cr)
PUBH 6601 - Born a Girl: Global Women's Health (1.0 cr)
PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
PUBH 6606 - Children's Health: Life Course and Equity Perspectives (2.0 cr)
PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
PUBH 6613 - Children and Youth With Special Health Care Needs (2.0 cr)
PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)
PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
PUBH 6673 - Grant Writing for Public Health (1.0 cr)
PUBH 6675 - Women's Health (2.0 cr)
PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
PUBH 6711 - Public Health Law (2.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6780 - Topics in Public Health Administration and Policy (1.0 - 3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
PUBH 6901 - Foundations of Public Health Nutrition Leadership (2.0 cr)
PUBH 6904 - Nutrition and Aging (2.0 cr)
PUBH 6906 - Global Nutrition (2.0 cr)
PUBH 6907 - Maternal, Infant, Child and Adolescent Nutrition (3.0 cr)
PUBH 6914 - Community Nutrition Intervention (3.0 cr)
PUBH 6915 - Nutrition Assessment (2.0 cr)
PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
PUBH 6954 - Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations (2.0 cr)
PUBH 6955 - Using Policy to Address the Weight-Related Health of Child and Adolescent Populations (1.0 cr)
PUBH 6995 - Community Nutrition Practicum (7.0 cr)
PUBH 6996 - Clinical Nutrition Practicum (7.0 cr)
PUBH 7091 - Independent Study: Community Health Promotion (1.0 - 4.0 cr)
PUBH 7193 - Directed Study: Environmental Health (1.0 - 4.0 cr)
PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
PUBH 7210 - Topics: Global Food Systems (0.5 cr)
PUBH 7214 - Principles of Risk Communication (1.0 cr)
PUBH 7221 - Planning for Urgent Threats (1.0 cr)
PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)
PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
PUBH 7235 - Surveillance of Zoonotic Pathogens in Animals (1.0 cr)
PUBH 7253 - Introduction to GIS (1.0 cr)
PUBH 7257 - Qualitative Data Analysis (1.0 cr)
PUBH 7262 - Globalization and Health (1.0 cr)
PUBH 7391 - Independent Study: Epidemiology (1.0 - 4.0 cr)
PUBH 7392 - Readings in Epidemiology (1.0 - 4.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7465 - Biostatistics Consulting (2.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7485 - Methods for Causal Inference (3.0 cr)
PUBH 7534 - Marketing for Health Care Professionals (1.0 cr)
PUBH 7537 - Healthcare Finance (3.0 cr)
PUBH 7542 - Quality Improvement and Patient Safety (2.0 cr)
PUBH 7547 - Health Care Human Resource Management (2.0 cr)
PUBH 7551 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 7553 - Health Care Management Ethics (1.0 cr)
PUBH 7554 - Health Care Strategy and Marketing (3.0 cr)
PUBH 7555 - Health Economics (2.0 cr)
PUBH 7556 - Health and Health Systems (2.0 cr)
PUBH 7560 - Operations Research and Quality in Health Care (3.0 cr)
PUBH 7562 - Information Technology in Health Care (2.0 cr)
PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 7569 - Health Care Policy (1.0 cr)
PUBH 7570 - Topics: Healthcare Administration (1.0 cr)
PUBH 7576 - Legal Considerations in Health Services Organizations (2.0 cr)
PUBH 7590 - Gerontology for Healthcare Managers (1.0 cr)
PUBH 7591 - Independent Study: Health Care Administration (1.0 - 4.0 cr)
PUBH 7691 - Independent Study: Maternal and Child Health (1.0 - 4.0 cr)
PUBH 7720 - Data to Drive Public Health (2.0 cr)
PUBH 7791 - Independent Study: Public Health Administration and Policy (1.0 - 6.0 cr)
PUBH 8120 - Occupational and Environmental Health Sciences Research Seminar (1.0 cr)
PUBH 8160 - Advanced Toxicology (2.0 cr)
PUBH 8166 - Experiences in Toxicology Research (3.0 cr)
PUBH 8194 - Directed Research: Environmental Health (1.0 - 6.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
PUBH 8393 - Directed Study: Clinical Research (1.0 - 4.0 cr)
PUBH 8401 - Linear Models (3.0 cr)
PUBH 8403 - Research Skills in Biostatistics (1.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8482 - Sequential and Adaptive Methods for Clinical Trials (3.0 cr)
PUBH 8485 - Methods for Causal Inference (3.0 cr)
PUBH 8492 - Theories of Hierarchical and Other Richly Parametrized Linear Models (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8810 - Research Studies in Health Care (3.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
PUBH 8814 - Mixed Methods: Quantitative and Qualitative Strategies in Research (2.0 cr)
PUBH 8816 - Implementation Science (2.0 cr)
PUBH 8821 - Health Economics II (3.0 cr)
PUBH 8830 - Writing for Research (2.0 cr)
PUBH 8831 - Writing for Research (2.0 cr)
SW 5101 - Human Behavior and the Social Environment (2.0 cr)
SW 5102 - Historical Origins and Contemporary Policies in Social Welfare (3.0 cr)
SW 5562 - Global Social Work and Social Development (3.0 cr)
SW 5904 - Facilitation and Conflict Management: Humanistic Approach (2.0 cr)
SW 5912 - Grief and Loss in Social Work Practice (1.0 cr)
SW 8151 - Social Work Methods: Practice With Individuals and Systems (2.0 cr)
SW 8152 - Social Work Practice Methods: Families and Groups (2.0 cr)
SW 8153 - Social Work Practice Methods: Macro Practice and Organizations (2.0 cr)
SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
SW 8262 - Empowerment Practice With Persons With Disabilities (3.0 cr)
SW 8263 - Essential Skills and Perspectives for Working with Older Adults (3.0 cr)
SW 8351 - Assessment and Engagement with Families and Children (3.0 cr)
SW 8352 - Intervention Methods with Families (3.0 cr)
SW 8363 - Social Work in Child Welfare (3.0 cr)
SW 8461 - Advanced Clinical Social Work Practice with Adults (3.0 cr)
SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)
SW 8552 - Advanced Community Practice: Leadership, Planning, and Program Development (3.0 cr)
SW 8563 - Advanced Policy Advocacy (3.0 cr)
SW 8804 - Child Welfare Policy (3.0 cr)
SW 8806 - Health and Mental Health Policy (3.0 cr)
SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)
SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)
SW 8841 - Social Work Research Methods (2.0 cr)
SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)
SW 8843 - Social Work Program Evaluation (1.0 - 2.0 cr)
SW 8851 - Social Welfare History and Historical Research Methods (3.0 cr)
SW 8901 - Assessment and Treatment of Trauma (2.0 cr)
SW 8902 - Social Work Supervision, Consultation, and Leadership (2.0 cr)
VMED 5101 - Molecular and Cellular Basis of Nanoparticle Toxicity (3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
VMED 8134 - Ethical Conduct of Animal Research (3.0 cr)
Twin Cities Campus
Epidemiology M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636).
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 38
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly into the MS Epidemiology program; it is available only by special arrangement. Students interested in a master's degree in epidemiology should apply for the master of public health (MPH) degree through the School of Public Health.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Please visit www.sph.umn.edu for admission requirements.

Special Application Requirements:
Students are not admitted directly into the MS program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 38 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: A master's project is required, which will be completed by taking two credits of PUBH 7394.

This program may be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

These requirements apply only to students admitted by special arrangement with the program; students are not admitted directly into the Epidemiology MS program. Courses must be taken A-F, unless offered only S/N. The minimum grade required for each A-F-graded course is B-.

Core Requirements (14-18 credits)

PUBH 6250 is only required for students who do not have an MPH or a bachelor's degree in Public Health.

PUBH 6250 - Foundations of Public Health (2.0 cr)
PUBH 6348 - Writing Research Grants (2.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
PUBH 8345 - How To Be An Anti-Racist Epidemiologist (1.0 cr)

Teaching Skills

GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)

Methods, Statistics, and Content Areas (10 credits)

Take the following course:

PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Methods/Statistics List

Select a minimum of 3 credits from the following:

PUBH 6915 - Nutrition Assessment (2.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 8141 - Doctoral Seminar in Observational Inference (2.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

Content Area Courses

Select a minimum of 4 credits from the following:

PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6333 - Principles of Human Behavior I (2.0 cr)
PUBH 6334 - Human Behavior II (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)

Electives (12 credits)

Select a minimum of 12 credits from the following:

PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6255 - Pathophysiology of Human Disease (4.0 cr)
PUBH 6370 - Social Epidemiology (2.0 cr)
PUBH 7391 - Independent Study: Epidemiology (1.0 - 4.0 cr)
PUBH 7392 - Readings in Epidemiology (1.0 - 4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
Capstone Project (2 credits)
Take 2 credits of PUBH 7394:
PUBH 7394 - Integrative Learning Experience: Epidemiology (1.0 - 6.0 cr)
**Twin Cities Campus**

**Epidemiology Minor**

*School of Public Health - Adm*

**School of Public Health**

Link to a list of faculty for this program.

**Contact Information:**
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Epidemiologists investigate the determinants of health and disease, and use data to identify changes in the public health burden of disease. The Epidemiology minor trains students to analyze public health trends, design and implement studies, and interpret results for policy and program development.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Epidemiology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

All required minor field coursework must be taken A-F and achieve a grade of B- or above. Electives can be taken S/N or A-F. If electives are taken A-F students must achieve a B- or above. If electives are taken A-F students must achieve a grade of B- or above.
Graduate credits can be applied toward the major or the minor/other requirement, but not both.

**Program Sub-plans**

Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Masters**

**Coursework Requirements (8 credits)**

**Required Courses (6 credits)**

Students must complete PUBH 6342 plus PUBH 6341 or PUBH 6320. Students choosing PUBH 6320 must earn a minimum grade of A-.
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Electives (2 credits)
Select 2 credits from the following in consultation with the Epidemiology director of graduate studies.
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)
PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)

Doctoral

Doctoral Minor Options
The doctoral minor can be completed in one of two ways: Option 1 is for students with the necessary background of epidemiology coursework, as determined by the Epidemiology director of graduate studies; Option 2 is for students without that necessary coursework.

Coursework Requirements (12 credits)
Required Courses: Option 1 (10 credits)
Students with the necessary epidemiology background take the following courses:
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
or Required Courses: Option 2 (10 credits)
Students without the necessary epidemiology background take the following courses:
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)

Electives (2 credits)
Select 2 credits from the following, or other coursework, in consultation with the Epidemiology director of graduate studies.
PUBH 6365 - Global Challenges in Infectious Disease Epidemiology (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7485 - Methods for Causal Inference (3.0 cr)
**Twin Cities Campus**

**Epidemiology Ph.D.**

*School of Public Health - Adm*

School of Public Health

Link to a list of faculty for this program.

**Contact Information:**
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 53 to 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Epidemiology PhD program trains students to examine public health trends, design and implement studies, interpret research results for policy and program development, and analyze significant public health problems. There are two tracks within the Epi PhD program: clinical/biological epidemiology (CBE) or social/behavioral epidemiology (SBE).

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must be in process, or have completed, a master's degree in a related field.

**Special Application Requirements:**
Strong quantitative aptitude, along with satisfactory grades in college-level quantitative courses. At least three recommendations (form and separate letter) from faculty and/or work supervisors with knowledge of the applicant's scholastic and professional capabilities and potential; statement of goals and objectives (letter of intent) for seeking a career in epidemiology.

In addition, applicants must submit a separate essay (statement of research interests) beyond what is required for the SOPHAS application process that provides evidence of their potential to conduct original research in a specific epidemiologic area and, if possible, indicates an interest in particular methodologies or study designs. Serious applicants are encouraged to contact the program coordinator at epichstu@umn.edu before applying. Students begin their studies in the fall semester. Applications must be completed by December 1 of the year prior to beginning the doctoral program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

29 to 39 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Courses offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

All Epidemiology PhD students must also complete the following components:

1. All Epidemiology PhD students, regardless of either SBE or CBE track, must attend 12 seminars.
2. All Epidemiology PhD students, regardless of either SBE or CBE track, with the exception of the MD/PhD students, must TA a course. (Students who are MD/PhD students do NOT need to TA a course).
3. All Epidemiology PhD students must give a minimum 50 minute lecture in an Epidemiology course.

Core Coursework (15 credits)

Take the following courses:

PUBH 6348 - Writing Research Grants (2.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
PUBH 6250 - Foundations of Public Health (2.0 cr)
PUBH 8345 - How To Be An Anti-Racist Epidemiologist (1.0 cr)

Teaching Course (1-3 credits)

Select one of the following, in consultation with the advisor. Students choosing GRAD 8200 must complete it with the following topic, 'Teaching & Learning: An Online Course'.

GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)

Thesis Credits

Take at least 24 doctoral thesis credits.

PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework

MD/PhD-Epidemiology

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Clinical/Biological Epidemiology

Clinical/Biological Track (13-23 credits)

Biological Methods/Statistics Course (3 credits)

Take the following course:

PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Additional Biostatistics Course (3 credits)

Select at least 3 credits from the following in consultation with the advisor:

PUBH 6915 - Nutrition Assessment (2.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Content Area Courses (2-4 credits)**
Students pursuing the joint MD/PhD degree select at least 2 credits in consultation with the advisor. All other students complete at least 4 credits:
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)

**Electives (5-13 credits)**
Students pursuing the joint MD/PhD degree select at least 5 elective credits in consultation with the advisor. All other students complete at least 13 elective credits:
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
PUBH 7391 - Independent Study: Epidemiology (1.0 - 4.0 cr)
PUBH 7392 - Readings in Epidemiology (1.0 - 4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)

**Social/Behavioral Epidemiology**

**Behavioral Methods/Statistics Course (3 credits)**
Take the following course:
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

**Additional Biostatistics Course (3 credits)**
Select at least 3 credits from the following in consultation with the advisor:
PUBH 6915 - Nutrition Assessment (2.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Content Area Courses (4 credits)**
Take the following courses:
PUBH 6333 - Principles of Human Behavior I (2.0 cr)
PUBH 6334 - Human Behavior II (2.0 cr)

**Electives (3-13 credits)**
Students pursuing the joint MD/PhD degree select at least 3 elective credits in consultation with the advisor. All other students complete at least 13 elective credits:
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6370 - Social Epidemiology (2.0 cr)
PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 7391 - Independent Study: Epidemiology (1.0 - 4.0 cr)
PUBH 7392 - Readings in Epidemiology (1.0 - 4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
PUBH 8344 - Advanced Epidemiologic Methods Workshop (1.0 cr)
Twin Cities Campus
Gerontology Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

As the population continues to age, the demand for graduates with knowledge of aging increases. The Gerontology minor provides an opportunity to enrich graduate studies with an interdisciplinary program focused on aging. Students enroll in a multidisciplinary foundation course and then select courses from core areas of psychosocial aging, geroscience/geriatrics, and policy.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer first with their major field advisor and director of graduate studies, and the Gerontology director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required courses must be taken A-F, and a minimum grade of B- must be earned for each course.

The minimum cumulative GPA for coursework applied to the minor is 3.00.

Required Course (2 credits)
Select 1 of the following in consultation with the Gerontology director of graduate studies:
GERO 5105 - Multidisciplinary Perspectives on Aging (2.0 cr)
or PUBH 6883 - Multidisciplinary Perspectives on Aging (2.0 cr)

Core Courses (6 credits)
Select 1 course from each of the 3 areas, in consultation with the Gerontology director of graduate studies, to meet the 6-credit...
Behavioral and Social Science Core
- GERO 5103 - Aging and Society (2.0 cr)
- GERO 5117 - Adult Development and Aging (2.0 cr)
- PUBH 6817 - Adult Development and Aging (2.0 cr)
- PUBH 6882 - Aging and Society (2.0 cr)

Geroscience and Geriatrics Core
- HSM 6584 - Long Term Care Health and Medical Needs (1.0 cr)
  or RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)

Policy and Long-term Care Core
- SW 8805 - Aging and Disability Policy (3.0 cr)
- PUBH 6518 - Equity and Long-Term Care Quality (2.0 cr)
- GERO 5518 - Equity and Long-Term Care Quality (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Electives
Select credits, in consultation with the Gerontology director of graduate studies, to complete the 12-credit requirement.

- ANES 7185 - Anesthesiology Advanced Elective (4.0 cr)
- BIOC 8102 - Hot Topics in the Biology of Aging (1.0 cr)
- FMCH 7520 - Rural Rotation in Family Medicine (4.0 cr)
- GERI 7200 - Advanced Clinical Geriatric Dentistry (1.0 - 10.0 cr)
- GERI 7210 - Geriatric Hospital Dentistry (1.0 - 6.0 cr)
- GERO 5125 - Gerontology Service Learning (1.0 - 3.0 cr)
- GERO 8022 - Fostering a Career in Aging Research (1.0 cr)
- HSM 6582 - Practicum in Long Term Care (1.0 cr)
- HSM 6583 - Long Term Care Supports and Services (2.0 cr)
- HSM 6584 - Long Term Care Health and Medical Needs (1.0 cr)
- HSM 6585 - Long Term Care Organizational Management (1.0 cr)
- HSM 6586 - Management in Assisted Living and Senior Care Settings (3.0 cr)
- HSM 6587 - Long Term Care Regulatory Management (1.0 cr)
- HSM 6588 - Long Term Care Quality Management and Performance Improvement (2.0 cr)
- HSM 6592 - Long Term Care Health Care Law (1.0 cr)
- HSM 6593 - Gerontology for Health Care Managers (1.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- NURS 6903 - Nurse Anesthesia Care: Special Populations Across the Lifespan (2.0 cr)
- OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
- ORSU 7190 - Acting Intern General, Reconstructive, and Geriatric Orthopaedics (4.0 cr)
- OT 7223 - Occupational Therapy Process for Older Adults I (3.0 cr)
- PA 8461 - Global and U.S. Perspectives on Health and Mortality (3.0 cr)
- PHAR 6754 - Diabetes and Metabolic Syndrome (2.1 cr)
- PHAR 6758 - Pulmonary Pharmacotherapy (1.1 cr)
- PHAR 6971 - Geriatric Pharmacotherapy (2.0 cr)
- PT 7011 - Topics in Geriatric Rehabilitation II (2.0 cr)
- SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
- SW 8262 - Empowerment Practice With Persons With Disabilities (3.0 cr)
- SW 8805 - Aging and Disability Policy (3.0 cr)


**Twin Cities Campus**

**Global Health Postbaccalaureate Certificate**

*School of Public Health - Adm*

**School of Public Health**

Link to a list of faculty for this program.

**Contact Information:**
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN  55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Global Health PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Global Health Certificate is designed for students who have a strong interest in global health, who have a desire to understand cultures, and who may want to experience first-hand a global applied practice experience which could prepare them for work in a global setting. Many students may want to complete the Certificate to complement their graduate degree.

It is increasingly recognized that issues that affect health transcend national boundaries, and that development and implementation of solutions to such health problems requires global cooperation. Global health represents an interdisciplinary approach that embraces both disease prevention in populations and clinical care of individuals, with a strong emphasis on health equity and health as a public good.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

**Accreditation**

This program is accredited by Council on Education for Public Health (CEPH)

**Program Delivery**

This program is available:
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:

- Applicants must hold a baccalaureate degree.

**Special Application Requirements:**

Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application instructions and requirements visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
- Paper Based - Total Score: 600
  • IELTS
    - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Students must take the required courses for A-F and achieve a grade of B- or above. Electives can be taken either A-F or S/N. Students must achieve a B- or above in elective courses taken A-F.

Coursework (15 credits)

Required Courses (5 credits)
Take the following courses:
- PUBH 6004 - Global Health Capstone (1.0 cr)
- PUBH 6108 - Foundations of Global Health (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)

Electives (10 credits)
Select at least 10 elective credits, in consultation with the director of graduate studies.
- GCC 5003 - Seeking Solutions to Global Health Issues [GP] (3.0 cr)
- GHSR 6713 - Global Health In Local Contexts (3.0 cr)
- PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6132 - Air, Water, and Health (2.0 cr)
- PUBH 6154 - Climate Change and Global Health (3.0 cr)
- PUBH 6194 - Climate Change and Public Health: The Science and Public Health Responses (2.0 cr)
- PUBH 6365 - Global Challenges in Infectious Disease Epidemiology (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6396 - Applied Practice Experience Global Health (0.5 - 8.0 cr)
- PUBH 6602 - Global Maternal and Child Health (2.0 cr)
- PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
- PUBH 6715 - India: Global Health, Globalization, & Leadership (3.0 cr)
- PUBH 6719 - International Humanitarian Crisis Simulation (1.0 cr)
- PUBH 6730 - International Comparative Health Systems (2.0 cr)
- PUBH 6732 - Topics and Methods in Global Health Assessment (2.0 cr)
- PUBH 6815 - Community-based Participatory Research (2.0 cr)
- PUBH 6906 - Global Nutrition (2.0 cr)
- PUBH 7262 - Globalization and Health (1.0 cr)
Global Public Health Minor

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The global public health minor provides students with the knowledge, skills and attitudes to address health issues that transcend national boundaries and to develop and implement solutions that require global cooperation. Students take public health courses that focus on the population health skills necessary to promote the health, well-being, and safety of global and local levels.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the global public health minor is contingent upon enrollment in a University master's or doctoral degree-granting program. Students should consult with their program advisor prior to contacting the Global Public Health director of graduate studies regarding requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All required minor coursework must be taken A-F and achieve a grade of B- or above. Elective courses may be taken either A-F or S/N. If taken A-F, students must achieve a B- or above for electives.

Required Coursework (5 credits)
Take the following courses:
- PUBH 6004 - Global Health Capstone (1.0 cr)
- PUBH 6108 - Foundations of Global Health (2.0 cr)
PUBH 6131 - Working in Global Health (2.0 cr)

Electives (2-7 credits)
Select electives in consultation with the Global Public Health director of graduate studies to meet the masters 7-credit or the doctoral 12-credit minimum.
GCC 5003 - Seeking Solutions to Global Health Issues [GP] (3.0 cr)
GHSR 6713 - Global Health In Local Contexts (3.0 cr)
PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6154 - Climate Change and Global Health (3.0 cr)
PUBH 6194 - Climate Change and Public Health: The Science and Public Health Responses (2.0 cr)
PUBH 6365 - Global Challenges in Infectious Disease Epidemiology (2.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6396 - Applied Practice Experience Global Health (0.5 - 8.0 cr)
PUBH 6602 - Global Maternal and Child Health (2.0 cr)
PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
PUBH 6715 - India: Global Health, Globalization, & Leadership (3.0 cr)
PUBH 6719 - International Humanitarian Crisis Simulation (1.0 cr)
PUBH 6730 - International Comparative Health Systems (2.0 cr)
PUBH 6732 - Topics and Methods in Global Health Assessment (2.0 cr)
PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 6906 - Global Nutrition (2.0 cr)
PUBH 7262 - Globalization and Health (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Health Care Administration M.H.A.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42 to 60
- This program requires summer semesters for timely completion.
- Degree: Master of Healthcare Administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Healthcare Administration (MHA) offers both a residential program and an executive track. The residential program, delivered in a learning cohort model, is a competency-based curriculum that emphasizes deep understanding of healthcare delivery and financing institutions, problem-solving, innovation, strategic thinking, and leadership development. The executive track is delivered in a dynamic learning cohort model through online coursework with synchronous in-person and/or online kick-off sessions each semester.

Accreditation
This program is accredited by Commission on Accreditation of Healthcare Management Education (CAHME)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants to the residential program should have:
- a strong commitment to managing people and resources to create and sustain outstanding healthcare services and organizations;
- strong quantitative and communication skills;
- completed coursework in statistics, accounting, microeconomics, and Excel/spreadsheets (recommended); and
- prior experience in healthcare (recommended).

Applicants to the executive track must have
- at least three years of management or clinical leadership experience in a healthcare organization.

Visit SPH for detailed application requirements at www.sph.umn.edu

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 42 to 60 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Advanced Problem Solving in Healthcare Administration, PUBH 6577, 2 credits.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Residential MHA

The residential MHA program requires 60 credits.

Required Courses (48-51 credits)

Full-time students take the following 51 credits, and dual-degree students select 48 credits from the following in consultation with the advisor:

- PUBH 6525 - Introduction to Population Health: A Health System (2.0 cr)
- PUBH 6535 - Managerial Accounting for Health Services (3.0 cr)
- PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
- PUBH 6542 - Management of Health Care Organizations (3.0 cr)
- PUBH 6544 - Principles of Problem Solving in Health Services Organizations (3.0 cr)
- PUBH 6547 - Health Care Human Resources Management (2.0 cr)
- PUBH 6554 - Healthcare Strategy and Marketing (2.0 cr)
- PUBH 6555 - Health Economics (2.0 cr)
- PUBH 6556 - Health and Health Systems (3.0 cr)
- PUBH 6557 - Health Finance I (3.0 cr)
- PUBH 6558 - Health Finance II (3.0 cr)
- PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
- PUBH 6562 - Information Technology in Health Care (2.0 cr)
- PUBH 6564 - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
- PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
- PUBH 6571 - Quality, Patient Safety, and Performance Improvement (2.0 cr)
- PUBH 6577 - Advanced Problem Solving in Health Services Administration (2.0 cr)
- PUBH 7596 - Clerkship in Health Care Administration (2.0 cr)
- PUBH 6527 - Healthcare Leadership and Effecting Change (2.0 cr)
- PUBH 6524 - The Twin Cities Learning Laboratory (1.0 cr)
- PUBH 6526 - Professional Development for Emerging Healthcare Leaders (1.0 cr)
- PUBH 6597 - Legal & Ethical Considerations in Health Services Organizations (3.0 cr)

Electives (9 credits)

Select coursework from the following in consultation with the advisor:

- ANTH 5009 - Human Behavioral Biology (3.0 cr)
- CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- ENTR 6025 - Introduction to Entrepreneurship (2.0 cr)
- FINA 6222 - Mergers and Acquisitions (2.0 cr)
- FINA 6241 - Corporate Financial Decisions and Analysis (4.0 cr)
- HINF 5430 - Foundations of Health Informatics I (3.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
- MBA 6111 - Leading Others (2.0 cr)
- MBA 6112 - Leading Organizations (0.0 - 1.0 cr)
- MBA 6231 - Financial Management (3.0 cr)
- MBA 6301 - Strategic Management (3.0 cr)
- MGMT 6004 - Negotiation Strategies (2.0 cr)
MGMT 6032 - Strategic Alliances (2.0 cr)
MGMT 6033 - Strategy Implementation (2.0 cr)
MGMT 6034 - Strategic Leadership (2.0 cr)
MGMT 6055 - Management of Innovation and Change (2.0 cr)
MGMT 6084 - Management of Teams (2.0 cr)
MGMT 6085 - Corporate Strategy (4.0 cr)
MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
MILI 6963 - Healthcare Analytics (2.0 cr)
MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
MILI 6996 - Medical Industry Valuation Laboratory II (2.0 - 4.0 cr)
MKTG 6088 - Strategic Marketing (3.0 cr)
NJURS 7606 - Relationship-Based Leadership and Management (3.0 cr)
PA 5108 - Board leadership development (1.0 cr)
PA 5926 - Presentation Skills: How to Inspire Your Audience and Change the World (1.0 cr)
PHAR 5201 - Applied Medical Terminology (2.0 cr)
PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
PUBH 6370 - Social Epidemiology (2.0 cr)
PUBH 6578 - Negotiation Strategies (2.0 cr)
PUBH 6606 - Children's Health: Life Course and Equity Perspectives (2.0 cr)
PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
PUBH 6735 - Principles of Health Policy (3.0 cr)
PUBH 6744 - State Health Policy and Politics (2.0 cr)
PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
PUBH 6772 - Health Disparities Capstone Seminar (1.0 cr)
PUBH 6804 - Mental Health Policy (2.0 cr)
PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6904 - Nutrition and Aging (2.0 cr)
PUBH 6955 - Using Policy to Address the Weight-Related Health of Child and Adolescent Populations (1.0 cr)
PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
PUBH 7584 - Health Care and Medical Needs (1.0 cr)
PUBH 7590 - Gerontology for Healthcare Managers (1.0 cr)
PUBH 7591 - Independent Study: Health Care Administration (1.0 - 4.0 cr)
SCO 6041 - Project Management (2.0 cr)
SCO 6045 - Strategic Sourcing (2.0 cr)
SCO 6051 - Service Management (2.0 cr)
SCO 6091 - Process Improvement Methods (2.0 cr)
SCO 6092 - Supply Chain Risk and Security (2.0 cr)
SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
PUBH 6580 - Behavioral Health Services Delivery (2.0 cr)
PUBH 6518 - Equity and Long-Term Care Quality (2.0 cr)
PUBH 6528 - Climate Change and Healthcare Delivery Organizations: Considerations for Healthcare Leaders and Prof (1.0 cr)

Dual Degree MBA/MHA Electives

Dual Degree MBA/MHA Electives
Dual degree students may choose from the following list of electives.
Electives (12 credits)
Select coursework from the following in consultation with the advisor:
ANTH 5009 - Human Behavioral Biology (3.0 cr)
CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
CSPH 5711 - Optimal Healing Environments (3.0 cr)
Joint- or Dual-degree Coursework:
MBA/MHA-Healthcare Administration
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Executive MHA Program
Executive MHA (42 credits)
Take the following courses:

- PUBH 7525 - Introduction to Population Health: A Health System Perspective (2.0 cr)
- PUBH 7533 - Leading with Impact in Healthcare (1.0 cr)
- PUBH 7537 - Healthcare Finance (3.0 cr)
- PUBH 7538 - Health Financial Principles (4.0 cr)
- PUBH 7541 - Statistics for Health Management Decision Making (3.0 cr)
- PUBH 7542 - Quality Improvement and Patient Safety (2.0 cr)
- PUBH 7547 - Health Care Human Resource Management (2.0 cr)
- PUBH 7551 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 7553 - Health Care Management Ethics (1.0 cr)
- PUBH 7554 - Health Care Strategy and Marketing (3.0 cr)
- PUBH 7555 - Health Economics (2.0 cr)
- PUBH 7556 - Health and Health Systems (2.0 cr)
- PUBH 7560 - Operations Research and Quality in Health Care (3.0 cr)
- PUBH 7562 - Information Technology in Health Care (2.0 cr)
- PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
- PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
- PUBH 7566 - Executive Capstone in Healthcare Leadership (2.0 cr)
- PUBH 7569 - Health Care Policy (1.0 cr)
- PUBH 7570 - Topics: Healthcare Administration (1.0 cr)
- PUBH 7576 - Legal Considerations in Health Services Organizations (2.0 cr)
Twin Cities Campus
Health Equity Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, Room A395, 420 Delaware Street SE, Minneapolis, MN  55455 (612-626-3500 or 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 7
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The health equity minor promotes understanding of the root causes of health inequalities and explores practice and policy solutions to eliminate health inequalities. Understanding structural factors that lead to health inequalities prepare students to develop strategies to promote health equity.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the health equity minor is contingent upon enrollment in a University master's or doctoral degree-granting program.

Students should consult with their program advisor, prior to then contact the Health Equity director of graduate studies regarding requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All required minor coursework must be taken on the A-F grade basis and an overall GPA of 3.0 maintained. The courses taken as electives can be taken A-F or S/N. Required courses and electives taken A-F must obtain a grade of B- or better.

Minor Coursework

Required Course (1 credit)
PUBH 6772 - Health Disparities Capstone Seminar (1.0 cr)

Select at least one course from list below:
CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)

Electives
Choose coursework to complete 7 credits for the masters minor, and 12 total credits for the doctoral minor. Electives coursework can be taken A-F or S/N.
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Health Services Research, Policy, and Administration M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 34
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Health Services Research, Policy & Administration (HSRPA) MS program includes a robust, multidisciplinary core curriculum that provides the foundation for conducting health services research and health analytics. Students work closely with their advisor on an area of specialization to develop a program tailored to their interests and professional needs.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Good math skills are essential. Previous coursework in algebra, statistics, or other quantitative coursework is recommended.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final Score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 34 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: The Plan B project comprises either an industry-specific project involving student collaboration with a local organization, or independent research conducted on a relevant topic of interest. The project is selected in consultation with and guided by the advisor.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework (21-22 credits)
In consultation with the advisor, select at least 21 credits from the following list. Students must receive a B- or better for PUBH 6450 and 6451. The majority of courses must be taken A-F.

PUBH 6250 - Foundations of Public Health (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)

Plan B Project (2 credits)
Take 2 Plan B Project credits in consultation with the advisor.

PUBH 7894 - MS in Health Services Research, Policy, and Administration Plan B Project (1.0 - 5.0 cr)

Using and Managing Data (4-5 credits)
Take 2 or more course(s) from the following:

- PUBH 6748 - Analyzing Administrative Data for Healthcare Operations and Research (2.0 cr)
- PUBH 6813 - Managing Electronic Health Information (2.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)

Electives (12-13 credits)
Select remaining coursework from the recommended electives, or courses from any specialization, in consultation with the advisor to meet the 34-credit minimum.

Programming and Analytic Methods (6 credits)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
MILI 6963 - Healthcare Analytics (2.0 cr)
PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6420 - Introduction to SAS Programming (1.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6739 - Data Dashboards and Visualization with Tableau (1.0 cr)
PUBH 6819 - Qualitative Research Theory and Methods for Health and Health Services Research (2.0 cr)
PUBH 7264 - Data Visualization in R (1.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)

Relevant public health/health services courses (6-7 credits)
Relevant Summer Public Health Institute courses, which vary from year to year, may also be included per advisor approval. Students may take PUBH 6320 or 6341 but not both.

PUBH 6735 - Principles of Health Policy (3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8814 - Mixed Methods: Quantitative and Qualitative Strategies in Research (2.0 cr)
PUBH 8816 - Implementation Science (2.0 cr)

Epidemiology
PVUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Joint- or Dual-degree Coursework: JD/MS-HSRP&A Students may take a total of 8 credits in common among the academic programs. Student may take a total of 8 credits in common among the academic programs.
Twin Cities Campus
Health Services Research, Policy, and Administration Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The health services research, policy, and administration minor is available to students who are interested in the social, political, and economic forces that affect the operations, financing, and delivery of health care. The minor offers a high degree of flexibility in course selection, tailored to students' individual interests and goals.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer first with their major field advisor and director of graduate studies, and the HSRP&A director of graduate studies regarding feasibility and requirements.

Approval of the HSRP&A director of graduate studies to pursue the minor is required.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework offered on both the A-F and S/N grading basis must be taken A-F, with a minimum grade of B- earned for each course.

The minimum cumulative GPA for minor field coursework is 3.00.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Coursework (3 credits)
Select one of the following in consultation with the HSRP&A director of graduate studies:
PUBH 6556 - Health and Health Systems (3.0 cr)
*or* PUBH 6724 - The Health Care System and Public Health (3.0 cr)

**Electives (3 credits)**
Select 3 credits from the following in consultation with the HSRP&A director of graduate studies:
- PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
- PUBH 6730 - International Comparative Health Systems (2.0 cr)
- PUBH 6735 - Principles of Health Policy (3.0 cr)
- PUBH 6737 - Structural Racism and Health (2.0 cr)
- PUBH 6744 - State Health Policy and Politics (2.0 cr)
- PUBH 6745 - Rural Health (2.0 cr)
- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6804 - Mental Health Policy (2.0 cr)
- PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6813 - Managing Electronic Health Information (2.0 cr)
- PUBH 6815 - Community-based Participatory Research (2.0 cr)
- PUBH 6819 - Qualitative Research Theory and Methods for Health and Health Services Research (2.0 cr)
- PUBH 6832 - Economics of the Health Care System (3.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6855 - Medical Sociology (3.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)

**Doctoral Required Coursework (12 credits)**
Students choose, in consultation with the HSRP&A director of graduate studies, the standard or health economics curriculum option.

**Option 1 Standard Curriculum**

**Required Coursework (5 to 6 credits)**
Select at least 5 credits from the following in consultation with the HSRP&A director of graduate studies. Students have the option to take PUBH 6735 and PUBH 8801 which must be taken together. Students can choose between PUBH 6556 and PUBH 6724 but credit will not be granted for both.
- PUBH 6556 - Health and Health Systems (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6735 - Principles of Health Policy (3.0 cr)
- PUBH 8801 - Health Services Policy Analysis: Theory (1.0 cr)
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)

**Electives (6 to 7 credits)**
Select credits from the following, in consultation with the HSRP&A director of graduate studies, to complete the 12-credit minimum:
- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6737 - Structural Racism and Health (2.0 cr)
- PUBH 6744 - State Health Policy and Politics (2.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6804 - Mental Health Policy (2.0 cr)
- PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6815 - Community-based Participatory Research (2.0 cr)
- PUBH 6832 - Economics of the Health Care System (3.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 6855 - Medical Sociology (3.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
- PUBH 6865 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6866 - Conducting Health Outcomes Research (3.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
- PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
- PUBH 8810 - Research Studies in Health Care (3.0 cr)
- PUBH 8811 - Research Methods in Health Care (3.0 cr)
- PUBH 8821 - Health Economics II (3.0 cr)
- PUBH 6813 - Managing Electronic Health Information (2.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
PUBH 8816 - Implementation Science (2.0 cr)
or Option 2  Health Economics Curriculum

**Required Coursework (6 credits)**
Take the following courses:
- PUBH 6832 - Economics of the Health Care System (3.0 cr)
- PUBH 8821 - Health Economics II (3.0 cr)

**Electives (6 credits)**
Select credits from the following, in consultation with the HSRP&A director of graduate studies, to complete the 12-credit minimum. Students selecting PUBH 6735 must also take PUBH 8801.
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 8811 - Research Methods in Health Care (3.0 cr)
- PUBH 6735 - Principles of Health Policy (3.0 cr)
- PUBH 8801 - Health Services Policy Analysis: Theory (1.0 cr)
Twin Cities Campus
Health Services Research, Policy, and Administration Ph.D.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2022
- Length of program in credits: 72 to 81
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The health services research, policy, and administration doctoral program offers a multidisciplinary examination of the social, political, and economic forces that affect the organization, financing, and delivery of health care. Graduates will be in a position to apply learned research skills to influence policy and positively impact health care systems in various sectors, including universities, government agencies, think tanks, health insurance providers, managed care organizations, and consulting firms.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
The PhD program requires prerequisites in calculus and statistics. Applicants who have not completed the prerequisites, but are otherwise qualified for admission, are required to take relevant courses at the University or another accredited institution before beginning the program.

Special Application Requirements:
Students who wish to pursue the Health Policy and Analysis concentration area must complete PubH 6724 or PubH 6556 either before enrollment by the end of the first year of the doctoral program.

See www.sph.umn.edu for additional admission requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
48 to 57 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

All coursework must be completed A-F.

Core Coursework (33-34 credits)
Courses must be completed with a minimum B- grade.
Take all of the following core courses. Students must take PUBH 6735 & PUBH 8801 during the same semester.
PUBH 6250 - Foundations of Public Health (2.0 cr)
PUBH 6735 - Principles of Health Policy (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6855 - Medical Sociology (3.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8801 - Health Services Policy Analysis: Theory (1.0 cr)
PUBH 8810 - Research Studies in Health Care (3.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
PUBH 8830 - Writing for Research (2.0 cr)
PUBH 8831 - Writing for Research (2.0 cr)

Econometrics and Biostatistics Requirement (7 credits minimum)
Select APEC 8211, 8212, 8213, and 8214, or PUBH 7401 and 7402, or PUBH 7402 and PUBH 8342 (Clinical Research Outcomes students only), in consultation with the advisor.

Econometrics
Only available to Health Economic students only. Recommended but not required.
APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)
APEC 8213 - Econometric Analysis III (2.0 cr)
APEC 8214 - Econometric Analysis IV (2.0 cr)

or Biostatistics
Clinical Outcomes Research students must select PUBH 7401 and PUBH 8342.
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)

Thesis Credits (24 credits)
Take at least 24 doctoral thesis credits.
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Concentration Areas

Multidisciplinary Social Sciences (20-22 credits)
The Multidisciplinary Social Science concentration area is designed for doctoral students who want a broad introduction to analytic perspectives from economics, sociology, and political science, along with statistics and econometrics.

Required Coursework (6 credits)
Take the following courses:
APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)

Required Theory Coursework (2-4 credits)
Select one of the following courses in consultation with the advisor:
APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8821 - Health Economics II (3.0 cr)
SOC 8701 - Sociological Theory (4.0 cr)
SOC 8721 - Social Psychology: Micro-Sociological Approaches to Inequalities and Identities (3.0 cr)

**Electives (12 credits)**
Select electives from the following list in consultation with the advisor:
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- ECON 8181 - Advanced Topics in Microeconomics (2.0 cr)
- ECON 8182 - Advanced Topics in Microeconomics (2.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)
- IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
- IDSC 8721 - Behavioral Decision Theory (3.0 cr)
- MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
- PA 8302 - Applied Policy Analysis (4.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
- PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
- SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
- SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
- SOC 8311 - Political Sociology (3.0 cr)
- SOC 8390 - Topics in Political Sociology (3.0 cr)
- SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
- SOC 8501 - Sociology of the Family (3.0 cr)
- SOC 8551 - Life Course Inequality & Health (3.0 cr)
- SOC 8731 - Sociology of Knowledge (3.0 cr)
- SOC 8735 - Sociology of Culture (3.0 cr)

**Sociology of Health and Illness (18 credits)**
The Sociology of Health and Illness concentration area emphasizes fundamental issues in medical sociology, such as social stratification, the social construction of health and illness, population dynamics, and demographic forces.

**Required Coursework (6 credits)**
Select at least 6 credits from the following list in consultation with the advisor:
- MGMT 8302 - Seminar in Organizational Theory (4.0 cr)
- PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
- SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
- SOC 8701 - Sociological Theory (4.0 cr)
- SOC 8731 - Sociology of Knowledge (3.0 cr)

**Electives (12 credits)**
Select at least 9 credits from the following list in consultation with the advisor:
- IDSC 8721 - Behavioral Decision Theory (3.0 cr)
- SOC 8101 - Sociology of Law (3.0 cr)
- SOC 8290 - Topics in Race, Class, Gender and other forms of Durable Inequality (3.0 cr)
- SOC 8311 - Political Sociology (3.0 cr)
- SOC 8390 - Topics in Political Sociology (3.0 cr)
- SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
- SOC 8501 - Sociology of the Family (3.0 cr)
- SOC 8551 - Life Course Inequality & Health (3.0 cr)
- SOC 8735 - Sociology of Culture (3.0 cr)
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)

**Advanced Methodology Coursework (3 credits)**
Select at least 3 credits from the following list in consultation with the advisor:
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- POL 8126 - Qualitative Methods (3.0 cr)
- PSY 8881 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)

-OR-

Health Decision Science (23 credits)
The Health Decision Science concentration area consists of a collection of quantitative methods used to evaluate decision making under uncertainty. There are many areas relevant to medical decision-making including decision analysis, cost-effectiveness analysis, disease simulation modeling, infectious disease modeling, quality-of-life assessment, utility elicitation, health outcomes assessment, and pharmacoeconomics.

Required Coursework (11 credits)
Take the following courses:
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
Select one of the following courses in consultation with the advisor:
  IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
  or
  IDSC 8721 - Behavioral Decision Theory (3.0 cr)

Electives (12 credits)
Select electives from the following list in consultation with the advisor. If PUBH 7401, 7402, 6809, or 6862 are completed as part of the required coursework, students will need to choose different course credits for electives.

IE 5080 - Topics in Industrial Engineering (1.0 - 4.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5441 - Financial Decision Making (4.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5522 - Quality Engineering and Reliability (4.0 cr)
IE 5524 - Process Transformation through Lean Tools (2.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5551 - Production and Inventory Systems (4.0 cr)
IE 5553 - Simulation (4.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
IE 5773 - Practice-focused Seminar (1.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6804 - Mental Health Policy (2.0 cr)
PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
PUBH 7465 - Biostatistics Consulting (2.0 cr)
PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 7485 - Methods for Causal Inference (3.0 cr)

-OR-

Clinical Outcomes Research (15 credits)

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Information current as of November 07, 2022
The Clinical Outcomes Research concentration area is designed to train health services researchers who wish to study clinical care, costs and outcomes. Their research may be conducted using observational (quasi-experimental) studies, randomized clinical trials, or analyses of secondary data sets, including administrative data.

**Required Coursework (9 credits)**
Take the following courses:
- PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
- PUBH 8343 - Synthesis and Application of Methods in Epidemiologic Research (3.0 cr)
Select one of the following:
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- or PUBH 7450 - Survival Analysis (3.0 cr)

**Electives (6 credits)**
Select at least 6 credits from the following list in consultation with the advisor:
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6819 - Qualitative Research Theory and Methods for Health and Health Services Research (2.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 8814 - Mixed Methods: Quantitative and Qualitative Strategies in Research (2.0 cr)
- PUBH 8816 - Implementation Science (2.0 cr)
One of the following courses may be selected as an elective, if not taken as a required course.
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- or PUBH 7450 - Survival Analysis (3.0 cr)

-OR-

**Health Policy and Analysis (14 credits)**
The Health Policy concentration area prepares students for careers in research, teaching, and public service in academic, governmental and public policy settings. The focus of this area includes multi-disciplinary training in the social sciences; application of quantitative research methods; rigorous writing and communication skill-based training.

**Required Coursework (2 credits)**
Take the following course:
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)

**Electives (12 credits)**
Select at least 12 credits from the following list in consultation with the advisor.
- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)

-OR-

**Health Economics (23 credits)**
Health Economics trains health economists who will rival PhDs from the top economics departments in competing for jobs in universities and research institutions. The curriculum includes a broad menu of health economics courses in addition to the multidisciplinary core courses.

**Required Course (3 credits)**
Take the following course:
- PUBH 8821 - Health Economics II (3.0 cr)

**Required Microeconomics Series (8 credits)**
Select four courses from one of the following series, in consultation with the advisor, for a total of 8 credits:
- **Applied Microeconomics**
  - APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
  - APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
  - APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
  - APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- **Required Microeconomic Theory Series**
  - ECON 8101 - Microeconomic Theory (2.0 cr)
  - ECON 8102 - Microeconomic Theory (2.0 cr)
  - ECON 8103 - Microeconomic Theory (2.0 cr)
  - ECON 8104 - Microeconomic Theory (2.0 cr)

**Electives (12 credits)**
In consultation with academic advisor, students select minimum 12 total credits from the following list.
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Econometric Analysis**
- APEC 8211 - Econometric Analysis I (2.0 cr)
APEC 8212 - Econometric Analysis II (2.0 cr)

Applied Economics
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)

Fundamentals of Biostatistical Inference
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)

Other Electives
Select courses from the following list in consultation with the advisor, to complete the credit minimum:
- APEC 8341 - Applied Public Finance (3.0 cr)
- APEC 8501 - Labor Economics I (2.0 cr)
- APEC 8502 - Labor Economics II (2.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- APEC 8701 - Trade and Development I (2.0 cr)
- APEC 8703 - Trade and Development III (2.0 cr)
- APEC 8803 - Marketing Economics (3.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)
- ECON 8107 - Macroeconomic Theory (2.0 cr)
- ECON 8108 - Macroeconomic Theory (2.0 cr)
- ECON 8117 - Noncooperative Game Theory (2.0 cr)
- ECON 8118 - Noncooperative Game Theory (2.0 cr)
- ECON 8182 - Advanced Topics in Microeconomics (2.0 cr)
- ECON 8186 - Advanced Topics in Macroeconomics (2.0 cr)
- ECON 8192 - Workshop in Mathematical Economics (1.0 cr)
- ECON 8312 - Economic Growth and Development (2.0 cr)
- ECON 8391 - Workshop in Economic Growth and Development (1.0 cr)
- ECON 8392 - Workshop in Economic Growth and Development (1.0 cr)
- ECON 8401 - International Trade and Payments Theory (2.0 cr)
- ECON 8402 - International Trade and Payments Theory (2.0 cr)
- ECON 8403 - International Trade and Payments Theory (2.0 cr)
- ECON 8491 - Workshop in Trade and Development (1.0 cr)
- ECON 8492 - Workshop in Trade and Development (1.0 - 3.0 cr)
- ECON 8501 - Wages and Employment (2.0 cr)
- ECON 8502 - Wages and Employment (2.0 cr)
- ECON 8503 - Wages and Employment (2.0 cr)
- ECON 8581 - Advanced Topics in Labor Economics (2.0 cr)
- ECON 8582 - Advanced Topics in Labor Economics (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8691 - Workshop in Applied Microeconomics (1.0 cr)
- ECON 8692 - Workshop in Applied Microeconomics (1.0 cr)
- ECON 8702 - Monetary Economics (2.0 cr)
- ECON 8703 - Monetary Economics (2.0 cr)
- ECON 8704 - Financial Economics (2.0 cr)
- ECON 8705 - Financial Economics (2.0 cr)
- ECON 8791 - Workshop in Macroeconomics (1.0 cr)
- ECON 8792 - Workshop in Macroeconomics (1.0 cr)
- ECON 8801 - Public Economics (2.0 cr)
- ECON 8802 - Public Economics (2.0 cr)
- ECON 8803 - Public Economics (2.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)

Joint- or Dual-degree Coursework: JD/PhD-Health Services Research Policy & Administration
Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus

Healthcare Management Postbaccalaureate Certificate

School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Healthcare Management PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Healthcare Management Certificate is designed for employed healthcare business and clinical professionals seeking to advance their management and leadership competencies. It provides students with practical knowledge and skills that can be applied immediately within their organizations. The certificate curriculum includes a focus on management in healthcare organizations and systems and is instructed by a combination of active practitioners and research active faculty. The coursework is designed to fit the lives of busy professionals: most of the coursework is online and asynchronous. Students in the certificate who decide to pursue the Master of Healthcare Administration degree can apply to the executive track and, if admitted, complete the degree by finishing the remaining required coursework.

Accreditation
This program is accredited by Commission on the Accreditation of Healthcare Management Education

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission to the certificate is decided by the MHA faculty with the advice and counsel of an admissions committee. Admission to the certificate requires the following:
- a bachelor’s degree from an accredited college or university
- at least two years of experience in the healthcare industry
- a letter of intent describing career interests and the relevance of the certificate to the applicant's personal development.

Note: Students are expected to bring a personal computer to the on-campus sessions.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All courses must be taken for an A-F grade.

Required Coursework (8 credits)
Take the following courses:
- PUBH 7538 - Health Financial Principles (4.0 cr)
- PUBH 7551 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 7556 - Health and Health Systems (2.0 cr)

Electives (4 credits)
Select one of the following 4-credit options, in consultation with the advisor, to complete the 12-credit minimum:

Standard (4 credits)
Take the following courses:
- PUBH 7555 - Health Economics (2.0 cr)
- PUBH 7565 - Innovation of Healthcare Services (2.0 cr)

or Behavioral Health (4 credits)
Take the following courses:
- PUBH 6580 - Behavioral Health Services Delivery (2.0 cr)
- PUBH 7547 - Health Care Human Resource Management (2.0 cr)

or Custom (4 credits)
Select at least 4 credits from the following in consultation with the advisor:
- PUBH 7525 - Introduction to Population Health: A Health System Perspective (2.0 cr)
- PUBH 7537 - Healthcare Finance (3.0 cr)
- PUBH 7541 - Statistics for Health Management Decision Making (3.0 cr)
- PUBH 7542 - Quality Improvement and Patient Safety (2.0 cr)
- PUBH 7553 - Health Care Management Ethics (1.0 cr)
- PUBH 7554 - Health Care Strategy and Marketing (3.0 cr)
- PUBH 7555 - Health Economics (2.0 cr)
- PUBH 7560 - Operations Research and Quality in Health Care (3.0 cr)
- PUBH 7562 - Information Technology in Health Care (2.0 cr)
- PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
- PUBH 7565 - Innovation of Healthcare Services (2.0 cr)
- PUBH 7569 - Health Care Policy (1.0 cr)
- PUBH 7570 - Topics: Healthcare Administration (1.0 cr)
- PUBH 7576 - Legal Considerations in Health Services Organizations (2.0 cr)
Twin Cities Campus
Maternal and Child Health M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42 to 48
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The maternal and child health MPH program focuses on public health skills development and maternal and child health content. There are two options: the standard program is for students who have limited professional experience and the advanced standing program is for students who either have an advanced degree (e.g., MD, MS, MSW, MED) or at least three years of professional experience related to maternal and child health or public health. Students must complete a minimum of 48 credits for the standard track and a minimum of 42 credits for the advanced standing track.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
At least one year of work or volunteer experience in a clinical, community-based, public health or managed-care agency/program that focuses on women, children, adolescents, and/or families.

Basic understanding of physiological and/or psychological human development as demonstrated by coursework, experience, and/or referenced readings.

Special Application Requirements:
Applicants to the advanced standing option must hold either an advanced degree (e.g., MS, MD, MSW) or have 3-5 years of experience directly related to maternal and child health.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 42 to 48 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Students complete an Integrated Learning Experience (ILE) in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses offered both A-F and S/N must be taken A-F, with a minimum grade of B- earned.

Public Health Core Requirements (16 credits)

- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Epidemiology (3 credits)

Select one of the following courses in consultation with the advisor:

- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Biostatistics (4 credits)

Select PUBH 6450 (4 credits) or PUBH 6414 (3 credits) plus one biostatistics programming course, in consultation with the advisor.

- PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6414 - Biostatistical Literacy (3.0 cr)

Students who take PUBH 6414 must select an additional course for at least 1 credit, in consultation with the advisor, from the following list:

- PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
- PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)

MCH Core (6 credits)

- PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)
- PUBH 6673 - Grant Writing for Public Health (1.0 cr)
- PUBH 6034 - Evaluation I: Concepts (3.0 cr)
- or PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)

Maternal and Child Health (6-8 credits)

Students completing the standard program select 8 credits from the following list and advanced-standing students select 6 credits. Courses are selected in consultation with the advisor.

Take 6 - 8 credit(s) from the following:

- PUBH 6602 - Global Maternal and Child Health (2.0 cr)
- PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
- PUBH 6606 - Children's Health: Life Course and Equity Perspectives (2.0 cr)
- PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
- PUBH 6613 - Children and Youth With Special Health Care Needs (2.0 cr)
- PUBH 6675 - Women's Health (2.0 cr)
- PUBH 6907 - Maternal, Infant, Child and Adolescent Nutrition (3.0 cr)

Methods and Analysis (3-5 credits)

Students completing the standard program select 5 credits, and advanced-standing students select at least 3 credits from the following list. PUBH 6107, PUBH 6325, and PUBH 6420 may not be appropriate for students taking PUBH 6414 to complete the biostatistics
programming requirement. Courses are selected in consultation with the advisor. Students may choose to take courses either S/N or A-F; if A-F, students must achieve a grade of B- or above.

Take 3 - 5 credit(s) from the following:
• PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
• PUBH 6035 - Evaluation II: Applications (3.0 cr)
• PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
• PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
• PUBH 6310 - Clinical Epidemiology 1 (1.0 cr)
• PUBH 6311 - Clinical Epidemiology II (1.0 cr)
• PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6389 - Nutritional Epidemiology (2.0 cr)
• PUBH 6414 - Biostatistical Literacy (3.0 cr)
• PUBH 6420 - Introduction to SAS Programming (1.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
• PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
• PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
• PUBH 6806 - Principles of Public Health Research (2.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)

Management, Communication, Policy and Advocacy Skills (3-5 credits)
Students in the standard track should select a minimum of 5 credits from the following list. Students in the advanced-standing track should select a minimum of 3 credits from the following list.

Take 3 - 5 credit(s) from the following:
• PUBH 6045 - Skills for Policy Development (1.0 cr)
• PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
• PUBH 6055 - Social Inequalities in Health (2.0 cr)
• PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
• PUBH 6074 - Mass Communication and Public Health (3.0 cr)
• PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
• PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
• PUBH 6711 - Public Health Law (2.0 cr)
• PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
• PUBH 6735 - Principles of Health Policy (3.0 cr)
• PUBH 6737 - Structural Racism and Health (2.0 cr)
• PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
• PUBH 6914 - Community Nutrition Intervention (3.0 cr)
• PUBH 6954 - Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations (2.0 cr)
• PUBH 6955 - Using Policy to Address the Weight-Related Health of Child and Adolescent Populations (1.0 cr)
• PUBH 7691 - Independent Study: Maternal and Child Health (1.0 - 4.0 cr)

Applied Practice (AP) Experience (1 credit)
Take at least one AP credit in consultation with the advisor.

PUBH 7696 - Applied Practice Experience: Maternal and Child Health (1.0 - 5.0 cr)

Integrated Learning Experience (ILE) (1 credit)
Take at least one ILE credit in consultation with the advisor.

PUBH 7694 - Integrative Learning Experience: Maternal and Child Health (1.0 - 4.7 cr)

Electives
Select electives in consultation with the advisor to complete 48-credit minimum for the standard program or the 42-credit minimum for the advanced-standing program.

CSPH 5111 - Ways of Thinking about Health (2.0 cr)
CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
CSPH 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)
CSPH 5305 - Introduction to Integrative Mental Health (2.0 cr)
CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
CSPH 5704 - Business of Health Coaching (2.0 cr)
CSPH 5706 - Lifestyle Medicine (2.0 cr)
CSPH 5707 - Coaching People with Clinical Conditions (2.0 cr)
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<thead>
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<th>Course Code</th>
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<tbody>
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<td>CSPH 5708</td>
<td>Mind-Body Science and the Art of Transformation (1.0 cr)</td>
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<td>CSPH 5709</td>
<td>Health and Wellbeing Group Coaching (2.0 cr)</td>
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<td>CSPH 5713</td>
<td>Health Coaching for Health Professionals (2.0 cr)</td>
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<td>Food Matters: Cook Like Your Life Depends On It (1.0 cr)</td>
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<td>EPSY 8264</td>
<td>Advanced Multiple Regression Analysis (3.0 cr)</td>
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<td>Statistical Analysis of Longitudinal Data (3.0 cr)</td>
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<tr>
<td>FSCN 4612W</td>
<td>Advanced Human Nutrition [WI] (4.0 cr)</td>
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<td>FSCN 4614W</td>
<td>Community Nutrition [SOCS, DSJ, WI] (3.0 cr)</td>
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<td>FSCN 4621</td>
<td>Nutrition and Metabolism (4.0 cr)</td>
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<tr>
<td>FSCN 4622</td>
<td>Nutritional Toxicology, the basic science of diet-related toxicants (3.0 cr)</td>
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<td>American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration (2.0 cr)</td>
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<tr>
<td>PUBH 6242</td>
<td>Cultural Humility with American Indian Populism (2.0 cr)</td>
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<td>PUBH 6243</td>
<td>American Indian Research, Evaluation and Collaborations (2.0 cr)</td>
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<tr>
<td>PUBH 6250</td>
<td>Foundations of Public Health (2.0 cr)</td>
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<tr>
<td>PUBH 6261</td>
<td>Human Centered Design for Public Health Leadership, Practice and Innovation (2.0 cr)</td>
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<tr>
<td>PUBH 6301</td>
<td>Fundamentals of Clinical Research (3.0 cr)</td>
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<tr>
<td>PUBH 6303</td>
<td>Clinical Research Project Seminar (2.0 cr)</td>
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<tr>
<td>PUBH 6310</td>
<td>Clinical Epidemiology I (1.0 cr)</td>
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<tr>
<td>PUBH 6311</td>
<td>Clinical Epidemiology II (1.0 cr)</td>
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<tr>
<td>PUBH 6320</td>
<td>Fundamentals of Epidemiology (3.0 cr)</td>
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<tr>
<td>PUBH 6325</td>
<td>Data Processing with PC-SAS (1.0 cr)</td>
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<tr>
<td>PUBH 6333</td>
<td>Principles of Human Behavior I (2.0 cr)</td>
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<td>PUBH 6341</td>
<td>Epidemiologic Methods I (3.0 cr)</td>
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<td>PUBH 6342</td>
<td>Epidemiologic Methods II (3.0 cr)</td>
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<tr>
<td>PUBH 6343</td>
<td>Epidemiologic Methods III (4.0 cr)</td>
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<tr>
<td>PUBH 6344</td>
<td>Completing the Integrated Learning Experience: Secondary Data Analysis (2.0 cr)</td>
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<tr>
<td>PUBH 6350</td>
<td>Epidemiologic Methods III: Lab (1.0 cr)</td>
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<tr>
<td>PUBH 6355</td>
<td>Pathophysiology of Human Disease (4.0 cr)</td>
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<tr>
<td>PUBH 6365</td>
<td>Global Challenges in Infectious Disease Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6370</td>
<td>Social Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6381</td>
<td>Genetics in Public Health in the Age of Precision Medicine (2.0 cr)</td>
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<tr>
<td>PUBH 6385</td>
<td>Epidemiology and Control of Infectious Diseases (2.0 cr)</td>
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<td>PUBH 6386</td>
<td>Cardiovascular Disease Epidemiology and Prevention (2.0 cr)</td>
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<tr>
<td>PUBH 6387</td>
<td>Cancer Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6389</td>
<td>Nutritional Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6396</td>
<td>Applied Practice Experience Global Health (0.5 - 8.0 cr)</td>
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<td>PUBH 6414</td>
<td>Biostatistical Literacy (3.0 cr)</td>
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<tr>
<td>PUBH 6420</td>
<td>Introduction to SAS Programming (1.0 cr)</td>
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<tr>
<td>PUBH 6432</td>
<td>Biostatistical Methods in Translational and Clinical Research (1.0 cr)</td>
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<tr>
<td>PUBH 6450</td>
<td>Biostatistics I (4.0 cr)</td>
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<tr>
<td>PUBH 6451</td>
<td>Biostatistics II (4.0 cr)</td>
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<td>PUBH 6525</td>
<td>Introduction to Population Health: A Health System (2.0 cr)</td>
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<tr>
<td>PUBH 6535</td>
<td>Managerial Accounting for Health Services (3.0 cr)</td>
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<td>PUBH 6541</td>
<td>Statistics for Health Management Decision Making (3.0 cr)</td>
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<tr>
<td>PUBH 6542</td>
<td>Management of Health Care Organizations (3.0 cr)</td>
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<tr>
<td>PUBH 6544</td>
<td>Principles of Problem Solving in Health Services Organizations (3.0 cr)</td>
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<tr>
<td>PUBH 6553</td>
<td>Health Care Management Ethics (1.0 cr)</td>
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<tr>
<td>PUBH 6554</td>
<td>Healthcare Strategy and Marketing (2.0 cr)</td>
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<tr>
<td>PUBH 6555</td>
<td>Health Economics (2.0 cr)</td>
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<tr>
<td>PUBH 6556</td>
<td>Health and Health Systems (3.0 cr)</td>
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<tr>
<td>PUBH 6558</td>
<td>Health Finance II (3.0 cr)</td>
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<tr>
<td>PUBH 6550</td>
<td>Operations Research and Quality in Health Care (3.0 cr)</td>
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<tr>
<td>PUBH 6552</td>
<td>Information Technology in Health Care (2.0 cr)</td>
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<tr>
<td>PUBH 6554</td>
<td>Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)</td>
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<tr>
<td>PUBH 6555</td>
<td>Innovation of Healthcare Services (2.0 cr)</td>
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<tr>
<td>PUBH 6570</td>
<td>Healthcare Administration (1.0 - 4.0 cr)</td>
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<tr>
<td>PUBH 6571</td>
<td>Quality, Patient Safety, and Performance Improvement (2.0 cr)</td>
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<tr>
<td>PUBH 6576</td>
<td>Understanding Clinical Quality Using Administrative Data (2.0 cr)</td>
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<tr>
<td>PUBH 6577</td>
<td>Advanced Problem Solving in Health Services Administration (2.0 cr)</td>
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<tr>
<td>PUBH 6578</td>
<td>Negotiation Strategies (2.0 cr)</td>
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<td>PUBH 6596</td>
<td>Legal Considerations in Health Services Organizations (2.0 cr)</td>
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<tr>
<td>PUBH 6601</td>
<td>Born a Girl: Global Women's Health (1.0 cr)</td>
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<td>PUBH 6605</td>
<td>Sexual, Reproductive, and Perinatal Public Health (2.0 cr)</td>
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<tr>
<td>PUBH 6606</td>
<td>Children's Health: Life Course and Equity Perspectives (2.0 cr)</td>
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<td>PUBH 6607</td>
<td>Adolescent Health: Issues, Programs, and Policies (2.0 cr)</td>
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<tr>
<td>PUBH 6613</td>
<td>Children and Youth With Special Health Care Needs (2.0 cr)</td>
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<td>Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)</td>
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<td>PUBH 6630</td>
<td>Foundations of Maternal and Child Health Leadership (3.0 cr)</td>
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<td>PUBH 6636</td>
<td>Qualitative Research Methods in Public Health Practice (2.0 cr)</td>
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<td>PUBH 6675</td>
<td>Women's Health (2.0 cr)</td>
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<td>PUBH 6670</td>
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<td>Public Health Law (2.0 cr)</td>
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<td>PUBH 6717</td>
<td>Decision Analysis for Health Care (2.0 cr)</td>
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<td>PUBH 6724</td>
<td>The Health Care System and Public Health (3.0 cr)</td>
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<td>PUBH 6727</td>
<td>Health Leadership and Effecting Change (2.0 cr)</td>
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<td>PUBH 6730</td>
<td>International Comparative Health Systems (2.0 cr)</td>
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<td>Principles of Health Policy (3.0 cr)</td>
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<td>PUBH 6737</td>
<td>Structural Racism and Health (2.0 cr)</td>
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<td>PUBH 6741</td>
<td>Ethics in Public Health: Professional Practice and Policy (1.0 cr)</td>
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<td>Ethics in Public Health: Research and Policy (1.0 cr)</td>
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<td>PUBH 6745</td>
<td>Rural Health (2.0 cr)</td>
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<td>PUBH 6751</td>
<td>Principles of Management in Health Services Organizations (2.0 cr)</td>
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<td>PUBH 6755</td>
<td>Planning and Budgeting for Public Health (2.0 cr)</td>
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<td>PUBH 6765</td>
<td>Continuous Quality Improvement: Methods and Techniques (3.0 cr)</td>
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<td>PUBH 6772</td>
<td>Health Disparities Capstone Seminar (1.0 cr)</td>
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<td>PUBH 6780</td>
<td>Topics in Public Health Administration and Policy (1.0 - 3.0 cr)</td>
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<tr>
<td>PUBH 6805</td>
<td>Introduction to Project Management for Health Professionals (2.0 cr)</td>
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<td>PUBH 6806</td>
<td>Principles of Public Health Research (2.0 cr)</td>
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<tr>
<td>PUBH 6809</td>
<td>Advanced Methods in Health Decision Science (3.0 cr)</td>
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<tr>
<td>PUBH 6813</td>
<td>Managing Electronic Health Information (2.0 cr)</td>
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<td>PUBH 6815</td>
<td>Community-based Participatory Research (2.0 cr)</td>
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<td>PUBH 6832</td>
<td>Economics of the Health Care System (3.0 cr)</td>
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<td>PUBH 6845</td>
<td>Using Demographic Data for Policy Analysis (3.0 cr)</td>
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<td>PUBH 6852</td>
<td>Program Evaluation in Health and Mental Health Settings (2.0 cr)</td>
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<tr>
<td>PUBH 6855</td>
<td>Medical Sociology (3.0 cr)</td>
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<td>PUBH 6862</td>
<td>Cost-Effectiveness Analysis in Health Care (3.0 cr)</td>
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<td>PUBH 6864</td>
<td>Conducting Health Outcomes Research (3.0 cr)</td>
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<td>PUBH 6901</td>
<td>Foundations of Public Health Nutrition Leadership (2.0 cr)</td>
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<tr>
<td>PUBH 6904</td>
<td>Nutrition and Aging (2.0 cr)</td>
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<tr>
<td>PUBH 6906</td>
<td>Global Nutrition (2.0 cr)</td>
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<tr>
<td>PUBH 6907</td>
<td>Maternal, Infant, Child and Adolescent Nutrition (3.0 cr)</td>
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<tr>
<td>PUBH 6914</td>
<td>Community Nutrition Intervention (3.0 cr)</td>
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<tr>
<td>PUBH 6915</td>
<td>Nutrition Assessment (2.0 cr)</td>
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<td>PUBH 6933</td>
<td>Nutrition and Chronic Diseases (2.0 cr)</td>
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<td>PUBH 6954</td>
<td>Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations (2.0 cr)</td>
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<tr>
<td>PUBH 6955</td>
<td>Using Policy to Address the Weight-Related Health of Child and Adolescent Populations (1.0 cr)</td>
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<tr>
<td>PUBH 6955</td>
<td>Community Nutrition Practicum (7.0 cr)</td>
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<td>PUBH 6996</td>
<td>Clinical Nutrition Practicum (7.0 cr)</td>
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<tr>
<td>PUBH 7091</td>
<td>Independent Study: Community Health Promotion (1.0 - 4.0 cr)</td>
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<tr>
<td>PUBH 7193</td>
<td>Directed Study: Environmental Health (1.0 - 4.0 cr)</td>
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<tr>
<td>PUBH 7200</td>
<td>Topics: Public Health Practice (0.5 - 4.0 cr)</td>
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<tr>
<td>PUBH 7210</td>
<td>Topics: Global Food Systems (0.5 cr)</td>
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<tr>
<td>PUBH 7214</td>
<td>Principles of Risk Communication (1.0 cr)</td>
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<tr>
<td>PUBH 7221</td>
<td>Planning for Urgent Threats (1.0 cr)</td>
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<tr>
<td>PUBH 7230</td>
<td>Topics in Infectious Disease (0.5 - 4.0 cr)</td>
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PUBH 8810 - Research Studies in Health Care (3.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
PUBH 8814 - Mixed Methods: Quantitative and Qualitative Strategies in Research (2.0 cr)
PUBH 8816 - Implementation Science (2.0 cr)
PUBH 8821 - Health Economics II (3.0 cr)
PUBH 8830 - Writing for Research (2.0 cr)
PUBH 8831 - Writing for Research (2.0 cr)

SW 5051 - Human Behavior and the Social Environment (2.0 cr)
SW 5101 - Historical Origins and Contemporary Policies in Social Welfare (3.0 cr)
SW 5562 - Global Social Work and Social Development (3.0 cr)
SW 5904 - Facilitation and Conflict Management: Humanistic Approach (2.0 cr)
SW 5912 - Grief and Loss in Social Work Practice (1.0 cr)
SW 8151 - Social Work Methods: Practice With Individuals and Systems (2.0 cr)
SW 8152 - Social Work Practice Methods: Families and Groups (2.0 cr)
SW 8153 - Social Work Practice Methods: Macro Practice and Organizations (2.0 cr)
SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
SW 8262 - Empowerment Practice With Persons With Disabilities (3.0 cr)
SW 8263 - Essential Skills and Perspectives for Working with Older Adults (3.0 cr)
SW 8351 - Assessment and Engagement with Families and Children (3.0 cr)
SW 8352 - Intervention Methods with Families (3.0 cr)
SW 8361 - Identification and Assessment of Family Violence (3.0 cr)
SW 8363 - Social Work in Child Welfare (3.0 cr)
SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)
SW 8452 - Core Concepts in Clinical Social Work Practice (3.0 cr)
SW 8461 - Advanced Clinical Social Work Practice with Adults (3.0 cr)
SW 8462 - Advanced Clinical Practice With Children and Adolescents (3.0 cr)
SW 8463 - Practice Interventions with Persons Who Experience Serious Mental Illness (3.0 cr)
SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)
SW 8552 - Advanced Community Practice: Leadership, Planning, and Program Development (3.0 cr)
SW 8563 - Advanced Policy Advocacy (3.0 cr)
SW 8804 - Child Welfare Policy (3.0 cr)
SW 8806 - Health and Mental Health Policy (3.0 cr)
SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)
SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)
SW 8841 - Social Work Research Methods (2.0 cr)
SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)
SW 8843 - Social Work Program Evaluation (1.0 - 2.0 cr)
SW 8851 - Social Welfare History and Historical Research Methods (3.0 cr)
SW 8901 - Assessment and Treatment of Trauma (2.0 cr)
SW 8902 - Social Work Supervision, Consultation, and Leadership (2.0 cr)
VMED 5101 - Molecular and Cellular Basis of Nanoparticle Toxicity (3.0 cr)
VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)
VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
VMED 5915 - Essential Statistics for Life Sciences (3.0 cr)
VMED 8134 - Ethical Conduct of Animal Research (3.0 cr)
Twin Cities Campus
Public Health Administration and Policy M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42 to 44
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Health Administration and Policy (PHAP) MPH program emphasizes the skills needed to become a leader and innovator in population health management analyses and policy. This MPH offers three routes to completion: the traditional, primarily residential 44-credit option; the fully online 44-credit option; and the executive, 42-credits option for working professionals.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Additional Executive PHAP requirements:
- at least 3 years removed from the completion of the undergraduate degree
- a minimum 3.00 undergraduate GPA
- employment or volunteer work in a field related to public health

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

Plan C: Plan C requires 42 to 44 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Students complete an Integrated Learning Experience (ILE) in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses must be taken A-F unless offered only S/N. Minimum grade of B- must be earned for required courses.

Public Health Core Requirements (17 credits)

Required Coursework (9 credits)

A minimum grade of B- is required.

- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)

Biostatistics Requirement

Take a biostatistics course and the biostatistics programming course. A minimum grade of B- is required.

Biostatistics Course (3 - 4 credits)

- PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6414 - Biostatistical Literacy (3.0 cr)

Biostatistics Programming Course (2 credits)

- PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)

Epidemiology (3 credits)

Take 1 of the following courses. A minimum grade of B- is required.

- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Applied Practice Experience (2 credits)

Take the following course in consultation with the advisor:

- PUBH 7796 - Applied Practice Experience: Public Health Administration and Policy (2.0 cr)

Integrative Learning Experience (2 credits)

Take 2 ILE credits in consultation with the advisor.

- PUBH 7794 - Integrative Learning Experience: Public Health Administration and Policy (2.0 cr)

PHAP Core Requirements (12 credits)

A minimum grade of B- is required for the following courses:

- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
- PUBH 6735 - Principles of Health Policy (3.0 cr)

Seminar (2 credits)

Students take this course twice for a total of two credits.

- PUBH 7784 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)

Electives (10 to 11 credits)

Take courses from the list below, or other coursework in consultation with the advisor.

- JOUR 5542 - Theory-based Health Message Design (3.0 cr)
- LAW 6036 - Reproductive Rights (3.0 cr)
- MILI 6421 - Healthcare Law: Strategic and Business Implications (2.0 cr)
- MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
- MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
- PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Executive Public Health Administration and Policy
This sub-plan is limited to students completing the program under Plan C.

The Executive Public Health Administration & Policy (E-PHAP) MPH program is tailored to working public and population health professionals currently in or seeking leadership roles in government agencies, nonprofits, health systems, and other organizations that aim to improve the health of populations.

The program is designed for early and mid-career professionals who have at least three years of professional experience and who are committed to managing organizations that improve public and population health.

The E-PHAP degree is a 42-credit program designed to be completed in 25 months. Students enrolled in the program will spend 17 days on campus where they will complete four intensive (7 credits total) in-person courses that include an online component. The remainder of the program is delivered in an online environment.

Public Health Core Requirements (17 to 18 credits)
Take the following courses. A minimum grade of B- must be earned for each course.

**Required Coursework (12 credits)**
- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
Biostatistics Requirement
Take a biostatistics course and the biostatistics programming course. A minimum grade of B- is required.

**Biostatistics Course (3 - 4 credits)**
- PUBH 6450 - Biostatistics I (4.0 cr)
  or PUBH 6414 - Biostatistical Literacy (3.0 cr)

**Biostatistics Programming Course (2 credits)**
- PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)

Integrated Learning Experience (2 credits)
Take 2 ILE credits in consultation with the advisor.
- PUBH 7794 - Integrative Learning Experience: Public Health Administration and Policy (2.0 cr)

E-PHAP Core Courses (16 credits)
Take the following courses. A minimum grade of B- must be earned for each course.
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6735 - Principles of Health Policy (3.0 cr)
- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6770 - Setting Priorities and Framing Public Health Issues (2.0 cr)
- PUBH 7720 - Data to Drive Public Health (2.0 cr)
- PUBH 7730 - Public Health Laws, Rules, and Regulations (1.0 cr)
- PUBH 7740 - Leadership and Leading Change (2.0 cr)

Applied Practice Experience (2 credits)
Take 2 credits in consultation with the advisor.
- PUBH 7796 - Applied Practice Experience: Public Health Administration and Policy (2.0 cr)

Electives
Select electives in consultation with the advisor as needed to complete the 42-credit requirement.
- LAW 6036 - Reproductive Rights (3.0 cr)
- MILI 6421 - Healthcare Law: Strategic and Business Implications (2.0 cr)
- MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
- MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
- PUBH 6060 - Motivational Interviewing: Strategies to Effect Behavior Change (1.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6108 - Foundations of Global Health (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6135 - Job Search Strategies and Career Professional Development (1.0 cr)
- PUBH 6365 - Global Challenges in Infectious Disease Epidemiology (2.0 cr)
- PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6576 - Understanding Clinical Quality Using Administrative Data (2.0 cr)
- PUBH 6606 - Children's Health: Life Course and Equity Perspectives (2.0 cr)
- PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
- PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 6730 - International Comparative Health Systems (2.0 cr)
- PUBH 6815 - Community-based Participatory Research (2.0 cr)
- PUBH 6855 - Medical Sociology (3.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- PUBH 7227 - Incident Management Systems: The Public Health Role (1.0 cr)
- PUBH 7235 - Surveillance of Zoonotic Pathogens in Animals (1.0 cr)
- PUBH 7242 - War and Public Health (1.0 cr)
- PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
- PUBH 7253 - Introduction to GIS (1.0 cr)
- PUBH 7257 - Qualitative Data Analysis (1.0 cr)
- PUBH 7262 - Globalization and Health (1.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7764 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
Twin Cities Campus
Public Health Core Concepts Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A316 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Public Health Core Concepts PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Health Core Concepts Certificate program is designed for working health or human services professionals, and includes the core content from our Master of Public Health degree programs. The certificate provides training that prepares public health workers and others to respond to emerging public health issues.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Completed baccalaureate degree required. Strong writing skills, strong math and science grades, and related work experience preferred.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Official transcripts will need to be sent directly to the School of Public Health.
- Resume or C.V.

For detailed application requirements and instructions visit www.sph.umn.edu.

International students who want to attend this program on a student visa should contact the University's International Student and Scholar Services (ISSS) office at https://isss.umn.edu/.

International applicants must submit score(s) from one of the following tests:

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of November 07, 2022
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must take all courses A-F and achieve a grade of B- or above.

**Required Coursework (15 credits)**

Public Health Courses (9 credits)
- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Epidemiology Course Options (3 credits)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Biostatistics Course Options (3-4 credits)
- PUBH 6450 - Biostatistics I (4.0 cr)
  or PUBH 6414 - Biostatistical Literacy (3.0 cr)
Twin Cities Campus
Public Health Data Science M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A396 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 43
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biostatistics (BIO) MPH in Public Health Data Science is intended for individuals with a strong interest in advancing public health via the application of methods from data science. The program equips students with the data management, computational manipulation, statistical analysis, and scientific communication skills that will allow them to contribute to designing, understanding, and implementing public health efforts in the future. Students in this program take coursework covering core topics in public health, including epidemiology, biostatistics, health policy, and environmental health. Additional coursework and internship opportunities provide training in the computational, biostatistical, and epidemiologic methods needed to analyze large, complex datasets relevant to public health.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by CEPH (Council on Education for Public Health)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
To be considered for admission, prospective students must have completed the equivalent of college algebra. Prior coursework in or exposure to statistics, programming, and calculus/linear algebra may be helpful but is not required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 43 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Students complete 1 credit of PUBH 7494 (Integrative Learning Experience)

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Public Health Core Requirements (12 credits)
Take the following courses for a total of 12 credits. A minimum grade of B- is required for each course.

- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Epidemiology Requirement
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Public Health Data Science Core Requirements (17 credits)
Take the following courses:

- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
- PUBH 7462 - Advanced Programming and Data Analysis in R (2.0 cr)
- PUBH 7463 - Fundamentals of Prediction and Machine Learning for Public Health (3.0 cr)
- PUBH 7465 - Biostatistics Consulting (2.0 cr)

Electives (12 credits)
Select 6 credits from each of the following 2 groups:

Methods and Study Design (6 credits)
Select 6 credits from the following list. Other 7xxx or 8xxx courses, or other methods courses at the 6xxx level or above, can be chosen with program director approval.

- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 7470 - Study Designs in Biomedical Research (3.0 cr)

Clinical Trial Options
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
  or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Programming, Databases and Visualization (6 credits)
Select 6 credits from the following list. Other courses can be chosen with program director approval.

- CSCI 5707 - Principles of Database Systems (3.0 cr)
- GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
- HINF 5430 - Foundations of Health Informatics I (3.0 cr)
- HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
- HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
- HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
- HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
- HINF 5630 - Clinical Data Mining (3.0 cr)
- MSBA 6331 - Big Data Analytics (3.0 cr)
- PUBH 6141 - GIS & Spatial Analysis for Public Health (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6739 - Data Dashboards and Visualization with Tableau (1.0 cr)
- PUBH 7253 - Introduction to GIS (1.0 cr)

Applied Practice Experience (1 credit)
Take the following course in consultation with the advisor.
**PUBH 7496 - Applied Practice Experience: Biostatistics (1.0 cr)**

**Integrative Learning Experience (1 credit)**
Take the following in consultation with the advisor.
**PUBH 7494 - Integrative Learning Experience: Biostatistics (1.0 - 3.0 cr)**
Twin Cities Campus
Public Health Food Protection Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 14
- This program requires summer semesters for timely completion.
- Degree: Public Health Food Protection PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: Applications are not being accepted at this time.

The Public Health Food Protection certificate is designed for professionals working in health or human services. It prepares public health workers and others to respond to incidents of bioterrorism, infectious disease outbreaks, and other emerging public health issues. Many students use the knowledge and skills gained to enhance opportunities in their current work or career path.

The curriculum can be completed by attending at least two sessions of the Public Health Institute, held in May and June every year.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
NOTE: Applications are not being accepted at this time.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application instructions and requirements visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Suggested Coursework (9 credits)
Select at least 9 credits of coursework in consultation with the advisor and director of graduate studies.
PUBH 7210 - Topics: Global Food Systems (0.5 cr)
PUBH 7214 - Principles of Risk Communication (1.0 cr)
PUBH 7215 - Food Safety: Risk Assessment and Risk Management (1.0 cr)
PUBH 7233 - Food System Defense: Vulnerabilities in the Food System (1.5 cr)
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
PUBH 6711 - Public Health Law (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)

Elective Courses (5 credits)
Select at least 5 credits in consultation with the academic advisor.

The pre-approved Topics courses are:
PUBH 7200 The Politics of Policy, Turning Good Ideas into Better Health (1 cr)
PUBH 7200 Food Labeling and Nutrition and Law (1 cr)
PUBH 7200 Epidemiology and Ecology of Mycobacterial Diseases (1 cr)
PUBH 7200 Global Studies in Infectious Disease (1 cr)
PUBH 7200 Understanding the Emergence of Zoonotic Diseases (1 cr)
PUBH 7217 - Advances in Molecular Epidemiological Analysis (1.0 cr)
or PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)
or PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
or PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
**Twin Cities Campus**

**Public Health Minor**

*School of Public Health - Adm*

**School of Public Health**

Link to a [list of faculty](#) for this program.

**Contact Information:**
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2022
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The graduate minor in public health is designed to prepare professionals in health and other fields (e.g., law, business, architecture, urban planning, teaching and engineering, including dual-degree students) to understand how their professional activities impact the health of communities, and to work together across disciplines, organizations, and sectors on innovative strategies to improve population health.

**Accreditation**
This program is accredited by Council on Education for Public Health (CEPH)

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the public health graduate minor is contingent upon enrollment in a master's or doctoral degree-granting program at the University of Minnesota. Students enrolled in graduate programs within the School of Public Health are not eligible for this minor.

Consult with your advisor and the public health director of graduate studies regarding the option of a minor in public health.

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

Required courses must be taken A-F, and a minimum grade of B- must be earned.
The overall minimum GPA for coursework applied to the minor is 3.0.

**Required Coursework (8 credits)**

**Required Course**
Take the following course:
PUBH 6250 - Foundations of Public Health (2.0 cr)
Take one of the following courses:
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

**Epidemiology Course**

Take one of the following courses:
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**

**Doctoral Electives (6 credits)**

Select 6 credits, in consultation with the Public Health director of graduate studies, to complete the 14-credit requirement.

- PUBH 6034 - Evaluation I: Concepts (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6076 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6108 - Foundations of Global Health (2.0 cr)
- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6132 - Air, Water, and Health (2.0 cr)
- PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6159 - Principles of Toxicology I (2.0 cr)
- PUBH 6160 - Principles of Toxicology II (3.0 cr)
- PUBH 6161 - Regulatory Toxicology (2.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- PUBH 6333 - Principles of Human Behavior I (2.0 cr)
- PUBH 6334 - Human Behavior II (2.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6370 - Social Epidemiology (2.0 cr)
- PUBH 6381 - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6386 - Cardiovascular Disease Epidemiology and Prevention (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6556 - Health and Health Systems (3.0 cr)
- PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
- PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
- PUBH 6675 - Women's Health (2.0 cr)
- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
- PUBH 6735 - Principles of Health Policy (3.0 cr)
- PUBH 6744 - State Health Policy and Politics (2.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6804 - Mental Health Policy (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)
- PUBH 6810 - Survey Research Methods (3.0 cr)
- PUBH 6815 - Community-based Participatory Research (2.0 cr)
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
PUBH 7405 - Biostatistical Inference I (4.0 cr)
PUBH 7406 - Biostatistical Inference II (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 8160 - Advanced Toxicology (2.0 cr)
PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
PUBH 8801 - Health Services Policy Analysis: Theory (1.0 cr)
PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
PUBH 8811 - Research Methods in Health Care (3.0 cr)
PUBH 8821 - Health Economics II (3.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
Twin Cities Campus
Public Health Nutrition M.P.H.
School of Public Health - Adm
School of Public Health

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42 to 58
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public health nutrition (PHN) MPH program is designed for students who are committed to health promotion and disease prevention through healthy eating. The curriculum emphasizes food access, nutrition policy, community nutrition interventions and programs, health disparities, nutrition assessment, and healthy eating throughout the life course. Students must complete a minimum of 42 credits.

The public health nutrition coordinated masters program (CMP) provides both an MPH in public health nutrition and the required coursework and internship hours to be eligible to take the RD exam. This is a highly competitive program. Students with a nutrition/dietetics undergraduate degree must complete a minimum of 52 credits, and students without a nutrition/dietetics undergraduate degree must complete a minimum of 59 credits.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Accreditation
This program is accredited by Council on Education for Public Health (CEPH) & Commission on Accreditation for Dietetics Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
All applicants must have completed the following:
- one general biology course with lab;
- two general chemistry classes with labs;
- one organic chemistry course;
- one biochemistry course;
- one human nutrition course; and
- one social science course.

The application deadline is July 1 for fall admission. All courses must be completed before starting the program. Applicants with outstanding prerequisites must include how those courses will be completed prior to the program.

Special Application Requirements:
CMP applicants must also complete:
- one physiology course;
- one microbiology course with lab;

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Information current as of November 07, 2022
one intro to nutrition course;
one intro to food science course; and
one food systems/service management course.

The application deadline for the CMP track is December 1. All courses must be completed before starting the program. Applicants with outstanding prerequisites must include how those courses will be completed prior to the program.

CMP applicants, upon admission to the MPH, undergo an additional email and phone interview process. Students admitted to the MPH but not the CMP track are not eligible to pursue the track at a later date.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 42 to 58 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Students complete an Integrated Learning Experience (ILE) in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Courses must be taken A-F unless offered only S/N. A minimum grade of B- must be earned for required courses.

4xxx-level coursework not accepted toward the degree, with the exception of courses required for students admitted to the MPH with non-nutrition/dietetics undergraduate degrees.

Public Health Core Requirements (7 credits)

PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6901 - Foundations of Public Health Nutrition Leadership (2.0 cr)

Epidemiology (3 credits)

PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Biostatistics (4 credits)

Select PUBH 6450 (4 credits) or PUBH 6414 (3 credits) plus one biostatistics programming course, in consultation with the advisor, to meet the 4-credit biostatistics requirement.
PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6414 - Biostatistical Literacy (3.0 cr)

Students who take PUBH 6414 must select an additional course for at least one credit, in consultation with the advisor, from the following list:

- PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
- PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)

Public Health Nutrition Core (7 credits)
PUBH 6914 - Community Nutrition Intervention (3.0 cr)
PUBH 6915 - Nutrition Assessment (2.0 cr)
PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)

**Lifespan Nutrition (4-5 credits)**
Select two courses from the following list in consultation with the advisor. CMP-track students with non-nutrition/dietetics undergraduate degrees must take PUBH 6904 and PUBH 6907.
Take 2 or more course(s) from the following:
- PUBH 6904 - Nutrition and Aging (2.0 cr)
- PUBH 6906 - Global Nutrition (2.0 cr)
- PUBH 6907 - Maternal, Infant, Child and Adolescent Nutrition (3.0 cr)

**Research Methods (3-4 credits)**
Select 3-4 credits from the following list, in consultation with the advisor:
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
- PUBH 6034 - Evaluation I: Concepts (3.0 cr)
- PUBH 6035 - Evaluation II: Applications (3.0 cr)
- PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6636 - Qualitative Research Methods in Public Health Practice (2.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6906 - Principles of Public Health Research (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)

**Integrated Learning Experience (1-2 credits)**
Take 1-2 credits in consultation with the advisor.
- PUBH 7994 - Integrated Learning Experience: Public Health Nutrition (1.0 - 6.0 cr)

**Electives**
Select electives, in consultation with the advisor, as needed to meet minimum credit requirements. Electives courses may be taken with a C- grade.
- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5118 - Whole Person, Whole Community: The Reciprocity of Wellbeing (3.0 cr)
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- CSPH 5303 - Pain Management and Evidence Based Complementary Health Approaches (3.0 cr)
- CSPH 5305 - Introduction to Integrative Mental Health (2.0 cr)
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
- CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
- CSPH 5704 - Business of Health Coaching (2.0 cr)
- CSPH 5706 - Lifestyle Medicine (2.0 cr)
- CSPH 5707 - Coaching People with Clinical Conditions (2.0 cr)
- CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
- CSPH 5709 - Health and Wellbeing Group Coaching (2.0 cr)
- CSPH 5713 - Health Coaching for Health Professionals (2.0 cr)
- CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 5807 - Mindfulness in the Workplace: Pause, Practice, Perform (2.0 cr)
- CSPH 5905 - Food Matters: Cook Like Your Life Depends On It (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5609 - Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- FSCN 4612W - Advanced Human Nutrition [WI] (4.0 cr)

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Information current as of November 07, 2022
FSCN 4614W - Community Nutrition [SOCS, DSJ, WI] (3.0 cr)
FSCN 4621 - Nutrition and Metabolism (4.0 cr)
FSCN 4622 - Nutritional Toxicology, the basic science of diet-related toxicants (3.0 cr)
FSCN 4665 - Medical Nutrition Therapy I (3.0 cr)
FSCN 4666 - Medical Nutrition Therapy II (3.0 cr)
FSCN 4732 - Food and Nutrition Management (3.0 cr)
FSCN 5131 - Food Quality for Graduate Credit (3.0 cr)
FSCN 5312 - Food Analysis (4.0 cr)
FSCN 5601 - Management of Eating Disorders (3.0 cr)
FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
FSOS 5015 - Family Research Laboratory (1.0 cr)
FSOS 5111 - Introduction to Family Therapy (3.0 cr)
FSOS 5701 - Prevention Science: Principles and Practices (3.0 cr)
FSOS 5937 - Parent-Child Interaction (3.0 cr)
FSOS 5942 - Diverse Family Experiences (3.0 cr)
FSOS 5944 - Curricular Design in Parent Education (3.0 cr)
FSOS 5945 - Teaching and Learning in Parent Education (3.0 cr)
FSOS 5946 - Assessment and Evaluation in Parent Education (3.0 cr)
FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
FSOS 8002 - Advanced Family Conceptual Frameworks (3.0 cr)
FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
FSOS 8036 - Couple/Marriage and Family Therapy Research (3.0 cr)
FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)
HINF 5430 - Foundations of Health Informatics I (3.0 cr)
HINF 5431 - Foundations of Health Informatics II (3.0 cr)
HINF 5440 - Foundations of Translational Bioinformatics (3.0 cr)
HINF 5450 - Foundations of Precision Medicine Informatics (3.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Informatics Methods for Health Care Quality, Outcomes, and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (3.0 cr)
HINF 5610 - Foundations of Biomedical Natural Language Processing (3.0 cr)
HINF 5620 - Data Visualization for the Health Sciences (3.0 cr)
HINF 5630 - Clinical Data Mining (3.0 cr)
HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
HSEX 6013 - Perspectives and Practices in Sexual Health Education (3.0 cr)
LAW 6036 - Reproductive Rights (3.0 cr)
LAW 6046 - Human Trafficking (2.0 cr)
LAW 6058 - Human Rights Advocacy (3.0 cr)
LAW 6621 - Rights in Conflict: Citizenship and Human Rights (2.0 cr)
LAW 6718 - Immigration and Criminal Law: Immigration Consequences of Crimes and Criminalizing Migration (2.0 cr)
LAW 6827 - Women's International Human Rights (2.0 cr)
LAW 6862 - Sexual Orientation, Gender Identity, and Human Rights (2.0 cr)
NURS 5029 - Introduction to Nursing Interventions (3.0 cr)
NURS 5031 - Human Response to Health and Illness: Adults and Elders (4.0 cr)
NURS 5032 - Human Response to Health and Illness: Children and Childbearing Families (5.0 cr)
NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
NURS 5116 - Consumer Health Informatics (2.0 cr)
NURS 5117 - Consumer Health Informatics Practicum (2.0 cr)
NURS 5190 - Essentials of Holistic Health Assessment and Foundational Clinical (3.0 cr)
NURS 5284 - Supporting Physiologic Labor and Childbirth for Nurses (2.0 cr)
NURS 5505 - Assessment and Support of Individuals in Labor (2.0 cr)
NURS 6110 - Epidemiology in Nursing (2.0 cr)
NURS 6213 - Reproductive Healthcare for Patients with Complex Conditions (2.0 cr)
NURS 6305 - Reproductive and Sexual Health Care (3.0 cr)
NURS 6600 - Health Systems and Care Models (3.0 cr)
NURS 6895 - Adult Acute Care Holistic Health Assessment and Wellness (2.0 cr)
NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
NURS 7100 - Quality Improvement and Implementation Science in Health Care (3.0 cr)
NURS 7108 - Population Health Informatics (2.0 cr)
NURS 7209 - Integrative Nursing I (1.0 cr)
NURS 7300 - Program Planning and Evaluation (3.0 cr)
NURS 8134 - (Inactive) (3.0 cr)
NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
NURS 8185 - Qualitative Data Analysis for Health Care Research (3.0 - 4.0 cr)
NUTR 5624 - Nutrition and Genetics (2.0 cr)
NUTR 5626 - Nutritional Physiology (3.0 cr)
NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
NUTR 8620 - Advances in Nutrition (2.0 cr)
OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
OLPD 5096 - Internship: Organizational Leadership, Policy, and Development (1.0 - 9.0 cr)
OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5107 - Gender, Education, and International Development (3.0 cr)
OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
OLPD 5346 - Politics of Education (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5502 - Comparative evaluation theory for practice (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
OLPD 5619 - Planning and Decision-Making Skills (1.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
OLPD 8502 - Advanced Evaluation Theory and Theory crafting (3.0 cr)
PA 5002 - Introduction to Policy Analysis (1.5 cr)
PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
PA 5004 - Introduction to Planning (3.0 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5013 - Law and Urban Land Use (1.5 cr)
PA 5021 - Microeconomics for Policy Analysis (3.0 cr)
PA 5022 - Applications of Economics for Policy Analysis (1.5 - 3.0 cr)
PA 5031 - Statistics for Public Affairs (4.0 cr)
PA 5032 - Applied Regression (2.0 cr)
PA 5033 - Multivariate Techniques (2.0 cr)
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
PA 5042 - Urban and Regional Economics (2.0 cr)
PA 5045 - Economic and Demographic Data Analysis (2.0 cr)
PA 5044 - Applied Regression, Accelerated (2.0 cr)
PA 5051 - Leadership Foundations (2.0 cr)
PA 5053 - Policy Analysis in Public Affairs (2.0 cr)
PA 5054 - Program Design and Implementation Analysis (2.0 cr)
PA 5055 - Qualitative Research Methods and Analysis (2.0 cr)
PA 5056 - Quantitative Research Methods and Analysis (2.0 cr)
PA 5081 - Understanding Power and Teamwork in Public Affairs Education (0.5 cr)
PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
PA 5103 - Leadership and Change (1.5 - 3.0 cr)
PA 5104 - Strategic Human Resource Management (3.0 cr)
PA 5105 - Integrative Leadership: Leading Across Sectors to Address Grand Challenges (3.0 cr)
PA 5113 - State and Local Public Finance (3.0 cr)
PA 5114 - Budget Analysis in Public and Nonprofit Orgs (1.5 cr)
PA 5116 - Financing Public and Nonprofit Organizations (1.5 cr)
PA 5122 - Law and Public Affairs (3.0 cr)
PA 5123 - Philanthropy in America: History, Practice, and Trends (1.5 - 3.0 cr)
PA 5135 - Managing Conflict: Negotiation (3.0 cr)
PA 5136 - Group Process Facilitation for Organizational and Public/Community Engagement (1.0 cr)
PA 5137 - Project Management in the Public Arena (1.5 cr)
PA 5145 - Civic Participation in Public Affairs (3.0 cr)
PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
PA 5209 - Urban Planning and Health Equity (3.0 cr)
PA 5211 - Land Use Planning (3.0 cr)
PA 5212 - Managing Urban Growth and Change (3.0 cr)
PA 5213 - Introduction to Site Planning (3.0 cr)
PA 5216 - (Inactive) (1.0 cr)
PA 5231 - Transit Planning and Management (3.0 cr)
PA 5234 - Urban Transportation Planning and Policy (3.0 cr)
PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
PA 5251 - Strategic Planning and Management (3.0 cr)
PA 5261 - Housing Policy (3.0 cr)
PA 5262 - Neighborhood Revitalization Theories and Strategies (3.0 cr)
PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
PA 5281 - Immigrants, Urban Planning and Policymaking in the U.S. (3.0 cr)
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
PA 5405 - Public Policy Implementation (3.0 cr)
PA 5413 - Early Childhood and Public Policy (1.5 - 3.0 cr)
PA 5415 - Effective Policies for Children in the First Decade (1.5 - 3.0 cr)
PA 5421 - Racial Inequality and Public Policy (3.0 cr)
PA 5426 - Community-Engaged Research and Policy with Marginalized Groups (3.0 cr)
PA 5431 - Public Policies on Work and Pay (3.0 cr)
PA 5451 - Development Planning and Policy Analysis (4.0 cr)
PA 5501 - Gender and International Development (3.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy Systems and Policy (3.0 cr)
PA 5723 - Water Policy (3.0 cr)
PA 5724 - Climate Change Policy (3.0 cr)
PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
PA 5801 - Global Public Policy (3.0 cr)
PA 5805 - Global Economics (3.0 cr)
PA 5813 - US Foreign Policy: Issues and Institutions (3.0 cr)
PA 5814 - Global Diplomacy in a Time of Change (3.0 cr)
PA 5823 - Human Rights and Humanitarian Crises: Policy Challenges (3.0 cr)
PA 5825 - Crisis Management in Foreign Affairs (1.5 cr)
PA 5826 - National Security Policy (3.0 cr)
PA 5885 - Human Rights Policy: Issues and Actors (3.0 cr)
PA 5927 - Effective Grantwriting for Nonprofit Organizations (1.5 cr)
PA 5928 - Data Management and Visualization with R (1.0 cr)
PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
PA 5933 - Survey Methods: Designing Effective Questionnaires (2.0 cr)
PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
PUBH 6004 - Global Health Capstone (1.0 cr)
PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
PUBH 6034 - Evaluation I: Concepts (3.0 cr)
PUBH 6035 - Evaluation II: Applications (3.0 cr)
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
PUBH 6050 - Community Health Promotion I: Integrating Theory, Evidence, and Context (3.0 cr)
PUBH 6051 - Community Health Promotion II: Developing, Implementing, and Justifying Interventions (3.0 cr)
PUBH 6055 - Social Inequalities in Health (2.0 cr)
PUBH 6060 - Motivational Interviewing: Strategies to Effect Behavior Change (1.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6081 - Sex, Sexuality, and Sexual Health (2.0 cr)
PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6105 - Policy Development in Environmental Health (2.0 cr)
PUBH 6108 - Foundations of Global Health (2.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)
PUBH 6117 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
PUBH 6135 - Job Search Strategies and Career Professional Development (1.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
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<th>Course Code</th>
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<th>Credit Hours</th>
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<tr>
<td>PUBH 6154</td>
<td>Climate Change and Global Health</td>
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<td>PUBH 6159</td>
<td>Principles of Toxicology I</td>
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<td>PUBH 6161</td>
<td>Regulatory Toxicology</td>
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<td>Introduction to Occupational Health and Safety</td>
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<td>PUBH 6173</td>
<td>Exposure to Physical Agents</td>
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<td>Environmental Measurements Laboratory</td>
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<td>Nanotechnology Health and Safety</td>
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<td>Surveillance of Foodborne Diseases and Food Safety Hazards</td>
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<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies</td>
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<td>Theory and Practice in Foodborne Disease Outbreak Detection, Investigation and Control</td>
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<td>PUBH 6184</td>
<td>Field and laboratory methods in public health entomology</td>
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<td>Measurement and Properties of Air Contaminants</td>
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<td>PUBH 6193</td>
<td>Advanced Topics in Human Exposure Science</td>
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<td>PUBH 6241</td>
<td>American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration</td>
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<td>Cultural Humility with American Indian Populations</td>
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<td>American Indian Research, Evaluation and Collaborations</td>
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<td>Foundations of Public Health</td>
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<td>Human Centered Design for Public Health Leadership, Practice and Innovation</td>
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<td>Fundamentals of Clinical Research</td>
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<td>Introduction to Population Health: A Health System</td>
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<td>Managerial Accounting for Health Services</td>
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<td>Statistics for Health Management Decision Making</td>
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<td>Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations</td>
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<td>PUBH 7720</td>
<td>Data to Drive Public Health</td>
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<td>Public Health Laws, Rules, and Regulations</td>
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<td>Methods for Causal Inference</td>
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<td>Theories of Hierarchical and Other Richly Parametrized Linear Models</td>
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<td>SW 8152</td>
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Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Standard Track
Courses must be taken A-F unless offered only S/N. Minimum grade of B- must be earned for required courses.

Applied Practice Experience (1-2 credits)
Take 1-2 credits in consultation with the advisor.

PUBH 7996 - Applied Practice Experience: Public Health Nutrition (1.0 - 5.0 cr)

Standard-track students with non-nutrition/dietetics degrees

Required Courses (8 credits)
Standard-track students must also complete the following 8-credit requirement if not taken previously in an undergraduate program:

FSCN 4621 - Nutrition and Metabolism (4.0 cr)
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)

Coordinated Masters Program
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The Public Health Nutritions Coordinated Masters Program (CMP) track is a 24-month program that provides additional didactic coursework and supervised practice components for registration eligibility and entry into dietetics practice. Students complete 1,200 hours of supervised practice, utilizing sites within and outside Minnesota, throughout the program. CMP students must provide their own transportation during the course of the program as many sites are not accessible via public transportation. MPH/CMP-track graduates will be provided with an eligibility verification statement for the national registration examination for dietitians.

Courses must be taken A-F unless offered only S/N. Minimum grade of B- must be earned for required courses.
Applied Practice Experience (22 credits)
Take the following courses, in consultation with the advisor. PUBH 7991 and PUBH 7996 each must be taken for 4 credits.
PUBH 6995 - Community Nutrition Practicum (7.0 cr)
PUBH 6996 - Clinical Nutrition Practicum (7.0 cr)
PUBH 7991 - Independent Study: Public Health Nutrition (1.0 - 4.0 cr)
PUBH 7996 - Applied Practice Experience: Public Health Nutrition (1.0 - 5.0 cr)

CMP-track students with non-nutrition/dietetics degrees

Required Courses (6 credits)
CMP-track students with non-nutrition/dietetics undergraduate degrees must also complete the following 6-credit requirement:
FSCN 4665 - Medical Nutrition Therapy I (3.0 cr)
FSCN 4666 - Medical Nutrition Therapy II (3.0 cr)
Twin Cities Campus
Public Health Postbaccalaureate Certificate in Performance Improvement
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Performance Improvement PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: Applications to the Performance Improvement Certificate program are not being accepted at this time. For more information, please contact sph-ask@umn.edu.

The public health certificate in performance improvement trains students to understand and apply quality improvement methods at both the systems and organizational level. The program will provide the tools needed in order to achieve and maintain high process performance.

The certificate provides participants with hands-on knowledge about how to improve processes in their respective organizations. By so doing, best practices will be diffused, and process performance will improve public health services.

This certificate addresses concerns voiced by the National Board of Public Health Examiners, the Public Health Accreditation Board, and the Council on Education for Public Health to provide more educational opportunities in performance improvement to working public health professionals.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
NOTE: Applications to the Performance Improvement Certificate program are not being accepted at this time. For more information, please contact sph-ask@umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Coursework**

- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6780 - Advanced Performance Improvement Methods in Public Health (2 cr)
- PUBH 6780 - Public Health Process Improvement Project - Practicum (3 cr)
- PUBH 6780 - Performance Management and Transformational Change (2 cr)

Students choose 2 elective credits with their advisor.
Twin Cities Campus
Public Health Practice M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A316 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636)
Email: php@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- Length of program in credits: 42
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public health practice MPH brings together the science and the art of public health, addressing public health as a broad social enterprise that seeks to extend the benefits of current knowledge in ways that will have the maximum impact on the health status of populations.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
To be eligible for an MPH in public health practice, applicants are required to have one of the following: 1) an advanced degree, or 2) completed the Public Health Core Concepts Certificate Program, or 3) admission/enrollment in a dual degree DDS, DNP, DVM, MHR, JD, MD, MPP, MURP, PharmD program at an accredited US College or University. Please note specific program accreditation is required for these programs if applicable.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 42 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Students complete at least 1 Integrated Learning Experience credit in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Courses must be taken A-F unless offered only S/N. Minimum grade of B- must be earned for required courses.

Public Health Core Requirements (12 credits)
Courses must be taken A-F, unless offered only S/N. A minimum grade of B- is required.

- PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6250 - Foundations of Public Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Biostatistics Requirement (4 credits)
Students select either PUBH 6450 Biostatistics I or PUBH 6414 Biostatistical Literacy plus a biostatistics programming course.

Biostatistics (4 credits)
Courses must be taken A-F, unless offered only S/N. A minimum grade of B- is required.

- PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6414 - Biostatistical Literacy (3.0 cr)

Biostatistics Programming Course Options
- PUBH 6107 - Excel Skills for Data Management in Public Health Settings (1.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6813 - Managing Electronic Health Information (2.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 7461 - Exploring and Visualizing Data in R (2.0 cr)
- PA 5929 - Data Visualization: Telling Stories with Numbers (2.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 7264 - Data Visualization in R (1.0 cr)

Applied Practice Experience (1 credit)
Take at least one credit of the following in consultation with the advisor.

- PUBH 7296 - Applied Practice Experience: Public Health Practice (0.5 - 8.0 cr)

Integrated Learning Experience (1 credit)
Take at least one credit of the following in consultation with the advisor.

- PUBH 7294 - Integrative Learning Experience: Public Health Practice (0.5 - 4.0 cr)

Electives (24 credits)
Select elective courses in consultation with the advisor to complete the 42 credit minimum.

- PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
- PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
- PUBH 6034 - Evaluation I: Concepts (3.0 cr)
- PUBH 6035 - Evaluation II: Applications (3.0 cr)
- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6060 - Motivational Interviewing: Strategies to Effect Behavior Change (1.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6081 - Sex, Sexuality, and Sexual Health (2.0 cr)
- PUBH 6094 - Interventions to Address Weight-Related Health and Eating Disorders (2.0 cr)
- PUBH 6106 - Foundations of Global Health (2.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6132 - Air, Water, and Health (2.0 cr)
- PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PUBH 6140</td>
<td>Occupational and Environmental Epidemiology</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6150</td>
<td>Interdisciplinary Evaluation of Occupational Health and Safety Field Problems</td>
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<tr>
<td>PUBH 6151</td>
<td>Occupational and Environmental Health Nursing Seminar</td>
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<tr>
<td>PUBH 6154</td>
<td>Climate Change and Global Health</td>
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<tr>
<td>PUBH 6170</td>
<td>Introduction to Occupational Health and Safety</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6181</td>
<td>Surveillance of Foodborne Diseases and Food Safety Hazards</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6182</td>
<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6183</td>
<td>Theory and Practice in Foodborne Disease Outbreak Detection, Investigation</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 6190</td>
<td>Environmental Chemistry</td>
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<td>PUBH 6255</td>
<td>Data Processing with PC-SAS</td>
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<td>PUBH 6355</td>
<td>Pathophysiology of Human Disease</td>
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<td>PUBH 6381</td>
<td>Genetics in Public Health in the Age of Precision Medicine</td>
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<td>PUBH 6385</td>
<td>Epidemiology and Control of Infectious Diseases</td>
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<td>PUBH 6386</td>
<td>Cardiovascular Disease Epidemiology and Prevention</td>
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<td>PUBH 6387</td>
<td>Cancer Epidemiology</td>
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<tr>
<td>PUBH 6389</td>
<td>Nutritional Epidemiology</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6420</td>
<td>Introduction to SAS Programming</td>
<td>1.0 cr</td>
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<td>PUBH 6535</td>
<td>Managerial Accounting for Health Services</td>
<td>3.0 cr</td>
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<td>PUBH 6541</td>
<td>Statistics for Health Management Decision Making</td>
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<td>PUBH 6556</td>
<td>Health and Health Systems</td>
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<td>PUBH 6562</td>
<td>Information Technology in Health Care</td>
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<td>PUBH 6568</td>
<td>Interprofessional Teamwork in Health Care</td>
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<td>PUBH 6573</td>
<td>The Nature of Clinical Care</td>
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<td>PUBH 6601</td>
<td>Born a Girl: Global Women's Health</td>
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<td>PUBH 6606</td>
<td>Children's Health: Life Course and Equity Perspectives</td>
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<td>PUBH 6607</td>
<td>Adolescent Health: Issues, Programs, and Policies</td>
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<td>PUBH 6613</td>
<td>Children and Youth With Special Health Care Needs</td>
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<td>PUBH 6627</td>
<td>Sexuality Education: Criteria, Curricula, and Controversy</td>
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<td>PUBH 6636</td>
<td>Qualitative Research Methods in Public Health Practice</td>
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<td>PUBH 6673</td>
<td>Grant Writing for Public Health</td>
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<td>PUBH 6675</td>
<td>Women's Health</td>
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<tr>
<td>PUBH 6702</td>
<td>Integrative Leadership Seminar</td>
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<td>PUBH 6711</td>
<td>Public Health Law</td>
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<td>PUBH 6717</td>
<td>Decision Analysis for Health Care</td>
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<td>PUBH 6724</td>
<td>The Health Care System and Public Health</td>
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<td>PUBH 6727</td>
<td>Health Leadership and Effecting Change</td>
<td>2.0 cr</td>
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<td>PUBH 6735</td>
<td>Principles of Health Policy</td>
<td>3.0 cr</td>
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<td>PUBH 6744</td>
<td>State Health Policy and Politics</td>
<td>2.0 cr</td>
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<td>PUBH 6755</td>
<td>Planning and Budgeting for Public Health</td>
<td>2.0 cr</td>
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<td>PUBH 6765</td>
<td>Continuous Quality Improvement: Methods and Techniques</td>
<td>3.0 cr</td>
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<td>PUBH 6803</td>
<td>Conducting a Systematic Literature Review</td>
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<td>PUBH 6804</td>
<td>Mental Health Policy</td>
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<td>PUBH 6805</td>
<td>Introduction to Project Management for Health Professionals</td>
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<td>PUBH 6806</td>
<td>Principles of Public Health Research</td>
<td>2.0 cr</td>
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<td>PUBH 6809</td>
<td>Advanced Methods in Health Decision Science</td>
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<td>PUBH 6810</td>
<td>Survey Research Methods</td>
<td>3.0 cr</td>
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<td>PUBH 6815</td>
<td>Community-based Participatory Research</td>
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<td>PUBH 6832</td>
<td>Economics of the Health Care System</td>
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<td>PUBH 6845</td>
<td>Using Demographic Data for Policy Analysis</td>
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<tr>
<td>PUBH 6852</td>
<td>Program Evaluation in Health and Mental Health Settings</td>
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<tr>
<td>PUBH 6855</td>
<td>Medical Sociology</td>
<td>3.0 cr</td>
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<tr>
<td>PUBH 6863</td>
<td>Understanding Health Care Quality</td>
<td>2.0 cr</td>
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<tr>
<td>PUBH 6904</td>
<td>Nutrition and Aging</td>
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<tr>
<td>PUBH 6906</td>
<td>Global Nutrition</td>
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<tr>
<td>PUBH 6907</td>
<td>Maternal, Infant, Child and Adolescent Nutrition</td>
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<td>PUBH 6914</td>
<td>Community Nutrition Intervention</td>
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<tr>
<td>PUBH 6920</td>
<td>Foundations of Interprofessional Professional Communication and Collaboration</td>
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<td>PUBH 6933</td>
<td>Nutrition and Chronic Diseases</td>
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<tr>
<td>PUBH 6954</td>
<td>Personal, Social and Environmental Influences on the Weight-Related Health</td>
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<td>PUBH 6955</td>
<td>Using Policy to Address the Weight-Related Health of Child and Adolescent</td>
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<tr>
<td>PUBH 7200</td>
<td>Topics: Public Health Practice</td>
<td>0.5 - 4.0 cr</td>
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<tr>
<td>PUBH 7210</td>
<td>Topics: Global Food Systems</td>
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<tr>
<td>PUBH 7214</td>
<td>Principles of Risk Communication</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 7227</td>
<td>Incident Management Systems: The Public Health Role</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 7230</td>
<td>Topics in Infectious Disease</td>
<td>0.5 - 4.0 cr</td>
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<tr>
<td>PUBH 7235</td>
<td>Surveillance of Zoonotic Pathogens in Animals</td>
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</table>
PUBH 7242 - War and Public Health (1.0 cr)
PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
PUBH 7257 - Qualitative Data Analysis (1.0 cr)
PUBH 7262 - Globalization and Health (1.0 cr)
PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
VMED 5881 - Food Production, Processing, and Supply Chain (1.0 cr)
VMED 5998 - Leadership to Address Global Grand Challenges (1.5 cr)

Joint- or Dual-degree Coursework: Applicants to one of these coordinated degree programs must be admitted/enrolled in the relevant advanced degree. Up to 14 credits are allowed to be in common and/or transferred.

MPP/MPH-Public Health Practice
MURP/MPH-Public Health Practice
JD/MPH-Public Health Practice
DNP/MPH-Public Health Practice
DDS/MPH-Public Health Practice
DVM/MPH-Public Health Practice
PharmD/MPH-Public Health Practice
MHR/MPH-Public Health Practice

Student may take a total of 14 credits in common among the academic programs.
Twin Cities Campus
Public Health Preparedness, Response, and Recovery Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2022
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Public Hlth Prepared/Response/Recovery PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Part of the Public Health Practice major, this certificate program helps to prepare public health workers and others to respond to incidents of bioterrorism, infectious disease outbreaks, and other emerging public health issues.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must hold a baccalaureate degree.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application requirements and instructions visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework

Take at least one course in each group below. Courses at the Public Health Institute are topical and will change from year to year. PUBH 7200 can meet the requirements of each group, depending on the topic. Please consult the program staff for appropriate courses.

Policy Development/Program Planning

Take 1 or more course(s) from the following:
• PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)

Analytical/Assessment Skills

Take 1 or more course(s) from the following:
• PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)
• PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
• PUBH 7235 - Surveillance of Zoonotic Pathogens in Animals (1.0 cr)

Communications Skills

Take 1 or more course(s) from the following:
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 7214 - Principles of Risk Communication (1.0 cr)

Cultural Competency Skills

Take 1 or more course(s) from the following:
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)

Community Dimensions of Practice Skills

Take 1 or more course(s) from the following:
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 7227 - Incident Management Systems: The Public Health Role (1.0 cr)

Leadership and Systems Thinking, Financial Planning and Management Skills

Take 1 or more course(s) from the following:
• PUBH 6711 - Public Health Law (2.0 cr)
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 7221 - Planning for Urgent Threats (1.0 cr)

Electives

Students select remaining credits from an approved list to complete the certificate's 12-credit minimum. Courses at the Public Health Institute are topical and will change from year to year. Please consult the program staff for appropriate courses.

Take 1 or more course(s) from the following:
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 7210 - Topics: Global Food Systems (0.5 cr)
• PUBH 7237 - Using Risk Analysis Tools: Estimating Food Safety on the Farm to Table Continuum (1.0 cr)
• PUBH 7253 - Introduction to GIS (1.0 cr)
Twin Cities Campus

Sexual Health Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware St SE, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636).
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2022
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The sexual health minor is designed for students who want to specialize in sex, sexuality, reproductive health, and sexual health. By taking public health courses tailored specifically to address sexual health, students are better able to enter the professional world with the confidence and skills needed to handle complex questions and issues related to sexual and reproductive health.

The School of Public Health is accredited by the Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students interested in the minor are strongly encouraged to confer with their major field advisor and director of graduate studies, and the Sexual Health director of graduate studies regarding feasibility and requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All required minor coursework must be taken A-F and achieve a grade of B- or above. Elective coursework can be taken A-F or S/N. If electives are taken A-F students must achieve a B- or above. Graduate credits can be applied toward either the major or the minor/other requirement, but not both.

Required Course
Take the following course:
  PUBH 6081 - Sex, Sexuality, and Sexual Health (2.0 cr)

Additional Coursework
Required Coursework
Select at least one course from the following list:
  PUBH 6011 - Public Health Approaches to HIV/AIDS (3.0 cr)
  PUBH 6605 - Sexual, Reproductive, and Perinatal Public Health (2.0 cr)
PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
PUBH 6675 - Women's Health (2.0 cr)
or Required course for non-SPH Students
Students pursuing a non-SPH graduate program must take at least one of the following courses, in consultation with the Sexual Health director of graduate studies:
PUBH 6020 - Fundamentals of Social and Behavioral Science (2.0 cr)
or PUBH 6250 - Foundations of Public Health (2.0 cr)

Electives
Select electives in consultation with the Sexual Health director of graduate studies to meet the masters 6-credit or the doctoral 12-credit minimum. The minimum grade required for a course taken for an A-F grade is B-.
AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
BTHX 8510 - Gender and the Politics of Health (3.0 cr)
FSOS 4101 - Sexuality and Gender in Families and Close Relationships (3.0 cr)
GWSS 4406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)
HSEX 6001 - Foundations of Human Sexuality (3.0 cr)
HSEX 6011 - Policy in Human Sexuality: Cutting Edge Analyses (3.0 cr)
LAW 6036 - Reproductive Rights (3.0 cr)
LAW 6046 - Human Trafficking (2.0 cr)
PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
LAW 6827 - Women's International Human Rights (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Doctoral